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BOTANICAL
GARDEN.

CHARLES C. LITTLE AND JAMES BROWN.

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BOSTON

JOURNAL OF NATURAL HISTORY.

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ART. I.—A REPORT ON THE REPTILES OF MASSACHUSETTS. By D. Humphreys Storer, M. D.

INTRODUCTION.

The following paper was prepared at the same time, and presented, with the "Report on the Fishes of the State," to the Chairman of the Zoological Commissioners. It is very far from being satisfactory to myself; and gladly would I have delayed its publication until further research had made it more complete. But being expected to give an account of my labors at an appointed time, I had no alternative left me, save to collect and present my descriptions, written oftentimes unavoidably with great haste and brevity.

The Catalogue of our Reptiles contained in Professor Hitchcock's Survey, prepared by Dr. Smith, of Sutton, contains most of our species, and was evidently drawn up with care; but as he has given no descriptions by which we may judge of his accuracy, I have felt at liberty, when a species has been catalogued which clearly should not be, or which the best herpetologists in our country, well ac-

quainted with the reptiles of New England, have never seen in our latitude, to omit it.

Thus we find catalogued the "*Testudo scabra.*" This error may have been produced by Say's incorrectly including this species in a paper "*On the fresh water and land Tortoises of the United States,*" published in the fourth volume of the Journal of the Academy of Natural Sciences. The species he considered the "*scabra,*" is the "*insculpta.*"

The "*Testudo Pennsylvanica*" is plainly confounded with the "*Sternothaerus odoratus,*" a widely-distributed species.

The "*Coluber striatulus*" of that catalogue, I have also omitted; not merely because I have not met with it myself, but because my friend Dr. Pickering, an accomplished naturalist, thoroughly versed in the herpetology of New England, assures me, he not only never met with it here, but never heard of its having been found here, it being strictly a southern species.

The "*Rana clamata*" I have also erased, because no one of my scientific friends has ever met with it; and Dr. Holbrook, who well knows the species, and has visited this portion of the country repeatedly of late years, to collect materials for his great work, says, in his third volume, this species "is found in the low countries of Carolina and Georgia; farther north than this, I have never seen it."

The "*Salamandra cinerea*" is omitted, because Dr. Green, who first described it, as well as the "*erythronota,*" considers them both one species.

The "*Salamandra tigrina*" and "*longicauda*" may perhaps both be found here; but knowing no one who had ever seen them in this State, I wrote to Dr. Emmons, upon whose authority they were given in that catalogue, for information; he writes me, that he thinks he has seen a specimen of each, but adds: "I will not take the responsi-

bility of giving these two species as citizens of the Bay State. I have not studied them carefully enough to be authority."

Having erased the above mentioned species, and introduced three Tortoises, two Colubers, one Heterodon, one Rana, one Hylodes, four Salamanders, and one Scincus, which were not noticed in the catalogue referred to, the Herpetology of our State, as far as I have been able to learn, is composed of fourteen genera and thirty-nine species. More extended investigation will undoubtedly ascertain the existence here of new species, as well as of many which have been already described by naturalists.

ORDER I.

CHELONIA.

Emys. Brogniart.

Generic characters. *Shell depressed, solid; sternum broad, solid, immovable, firmly joined to the shell, consisting of twelve plates, and four supplemental ones; extremities palmated, anterior with five nails, posterior with four; head of ordinary size; tail long.*

E. *guttata.* Schneider.

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 47, et fig.
Ann. Lyc. Nat. Hist. N. Y. vol. iii. p. 117.
Harlan's Med. and Phys. Res. p. 151.
Dum. et Bibron, Hist. Nat. des Rept. tom. ii. p. 295.
N. A. Herp. vol. ii. p. 25, et fig.

This, our most common species of *tortoise*, is found in small streams and clear water throughout the State, oftentimes in great numbers; a very concise description only is therefore offered:

The upper shell is black, sprinkled over its whole surface with more or less distant, roundish, bright yellow spots. In some specimens, eight or ten quite small spots may be seen crowded upon a single plate; while in others, several of the plates, particularly those on the dorsum, exhibit but one spot each, brighter colored and larger than those just referred to.

The sternal plates are yellowish, with large black blotches, or black with yellowish blotches, or uniformly black. Sometimes the plates of the sternum are perfectly smooth, at other times marked with concentric striæ. The top of the head, and upper part of the legs, black with yellow spots.

It feeds upon insects, worms and frogs.

E. *picta*. Schneider. *The painted Tortoise.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 45, et fig.
Ann. Lyc. Nat. Hist. N. Y. vol. iii. p. 115.
Harl. Med. and Phys. Res. p. 151.
Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 297.
N. A. Herpet. vol. ii. p. 19, et fig.

Next to the "*guttata*," this is the most generally distributed species. It is usually found with the preceding, and is a very easily recognised species. A specimen five inches in length, serves for the following description:

Body, above, compressed; upper shell, greenish brown, with the edges of the dorsal and lateral plates margined with yellow. A very narrow yellow dorsal line passes from the anterior to the posterior marginal plate; the marginal plates are darker colored than the other plates of the upper shell, having in their centre a bright red blotch, which is much larger upon the inferior side; and over this blotch, one or two red markings, which are concentric upon the plates not attached to the sternum, and nearly straight upon the four plates which are thus attached; the red color predominates upon the under side of the marginal plates.

First dorsal plate quadrangular: second and fourth, hexagonal; third, quadrangular; fifth, heptagonal.

Sternal plates yellow, with a triangular ribbon upon the anterior portion, and a straight one upon the middle and posterior portions, of a brighter tint.

Back of the head, dark brown; directly back of the eyes, a broad yellow band; a narrower band of the same color runs also back, from the middle of the eye. From the tip of the snout, a narrow yellow line runs to each eye; from the side of the mouth also, two lines pass to the middle of the eye, and two from the lower edge of the jaw. From the extremity of the lower jaw, two larger bands run backwards; the first passes slightly down, then outwardly to the angle of the lower jaw, whence it is continued by a broad bright yellow band; within this, from the middle of the lower jaw, a narrower band of the same color passes back parallel with this; and from the tip of the chin a band runs down

a short distance, and then bifurcates into broader bands. These yellow lines upon the head become red upon the neck, and are continued on to the shoulders of this color. Two large yellow spots upon the occiput. Eyes small; pupils, a deep black; irides golden; a dark line running through their centre. *Fore legs* black, a red band passing along their centres; and the commencement of a second, on a line with the base of the previous one; phalanges marked with red lines. Hind feet, dark brown, above; beneath, lighter, with a red band on each side. Tail of moderate length, with two narrow longitudinal yellow bands uniting at the posterior extremity; beneath, marked by the narrow red lines of the legs continued, which unite at the posterior portion, forming a single red band.

Its food is the same as that of the previous species.

E. *insculpta*. Le Conte. *The wood Tortoise.*

Ann. Lyc. N. Y. vol. iii. p. 112.
Harlan's Med. and Phys. Res. p. 152.
Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 251.

Specimens of this, our most beautiful tortoise, I have received from Walpole, Concord, Amherst and Andover, and learn that it is not uncommon in the ponds of several other portions of the State. This species wanders a great distance from, and remains a long time out of the water; and being oftentimes found in *woods* and *pastures*, has received the common name of *wood tortoise.* Its usual length is from six to eight inches. The upper shell is composed of

five dorsal, eight lateral, and twenty-five marginal plates; these plates are of a greenish brown color, strongly marked with concentric and radiating striæ. A dorsal ridge is formed by the convex portion of the superior plates. Sternum composed of twelve yellow plates, having upon their posterior lateral margins, a large black spot. All the under portion of the legs, neck and tail, is red.

Young specimens exhibit a very rough upper shell, produced by the prolongations of the posterior angles of the plates.

This species was erroneously considered by Say, as synonymous with the "*scabra*," Lin.; and as such, he catalogued it in the 4th Vol. J. A. N. S.

Sternothaerus. Bell.

Generic characters. *Head subquadrangular, pyramidal, covered in front with a single plate; warts on the chin; marginal plates, twenty-three; sternum cruciform, bivalve, anterior valve only moveable; supplemental plates contiguous, placed on the sterno-costal suture; anterior extremity with five nails, posterior with four.*

S. *odoratus.* *The mud Tortoise.*

Ann. Lyc. Nat. Hist. N. Y. vol. iii. p. 122.
Harl. Med. and Phys. Res. p. 156.
Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 358.
N. A. Herpet. v. iii. p. 29, et fig.

Shell oblong, convex, somewhat carinated on the

dorsal ridge; of a brownish color, irregularly blotched with darker spots.

The first vertebral plate is triangular, the next three hexagonal, the last pentagonal. There are four lateral plates; the first of which is quadrangular, the remainder are pentagonal. The marginal plates, twenty-three in number, are small, generally elongated, forming a margin; the posterior plates largest, and appearing as if they were a continuation of the last vertebral plate.

Sternum small, composed of nine yellowish brown plates; it is divided into three portions by two ligamentous hinges; the anterior, composed of three plates, is quite moveable upon the second division; the third portion, of four plates, the posterior of which are emarginated, and have their posterior angles acute, although united to the second division of the sternum, consisting of the two large abdominal plates, by a similar hinge with the first, is scarcely moveable.

Head pointed, flattened above; snout, truncated. Eyes moderate in size; pupils black, irides golden. Nostrils, large at the extremity of the snout. Top of the head nearly black. A narrow yellow line passes from the tip of the snout backwards over each eye, and is lost upon the neck; a second line of the same color, larger and much brighter, is continued backward beneath the eyes to the neck. A broad yellow band is also observed upon each side of the chin, exhibiting a striking contrast with the dark brown color of the jaws. Skin of the neck, throat and legs, ash colored. Neck, covered with granula-

tions. Several yellowish warts or cirrhi upon the throat. Legs and feet slightly granulated; upon the anterior legs, three large scaly plates; at the base of the feet several smaller scales of a similar character; these scales do not exist upon the fore legs, although they do upon the feet. Toes palmated; fore feet with five toes, and five claws; posterior, five toed, with four claws. Tail short, with several rows of pointed warts.

The specimen from which I have drawn the above description, is three inches and a half long, one inch and a half high. Of six specimens lying before me, five do not vary a line in length. The sixth, which is considerably younger, is less than three inches in length; has a more marked dorsal ridge than either of the others, and the blotches are more numerous.

This species has a very disgusting odor, and is hence sometimes called *stink-pot.*

It is found burying itself in the mud in ditches and small ponds, frequently covered with a thick coat of foreign matter, from which circumstance it has received the common name of *mud tortoise.*

A single specimen of this species was found in Fresh Pond, in Cambridge, by J. W. Randall, M. D.; one specimen was taken at Amherst, and several at Falmouth, by Professor C. B. Adams; and Mr. Erastus H. Clap brought me one from Walpole.

Emysaurus. Dumeril.

Generic characters. *Head large, covered with small plates; snout short; jaws hooked; two warts beneath the chin; sternum immoveable, cruciform, composed of ten plates; three sterno-costal plates; fore feet with five claws, hind feet with four; tail long, surmounted with a scaly crest.*

E. *serpentina.* Lin. *The snake Tortoise.*

Shaw's Zoology, vol. iii. pt. 1. p. 72, et fig.
Ann. Lyc. N. Y. vol. iii. p. 128.
Dum. et Bibr. Hist. Nat. des Rept. vol. ii. p 350.

This is the largest tortoise found within the borders of our State; sometimes weighing from 15 to 20 pounds. It is exceedingly powerful and voracious, feeding upon fishes and frogs; and the farmers sometimes complain of its depredations among their chickens and ducklings. From its habit of snapping suddenly at almost every thing offered it, it is generally known by the name of the "*snapping tortoise.*" in New England, while its crested tail, resembling the Crocodilus lucius, gives it the distinction at the South, of "*alligator tortoise.*" It is usually found in filthy water, and is occasionally met with at considerable distance from any pond or pool, dragging itself leisurely along.

The flesh of this species is often used as food, and when made into a soup is considered by many as quite a delicacy. The *oil* obtained from this species is carefully preserved in many portions of

the interior of the State, for its supposed virtues in bruises, sprains, &c. when externally applied.

The upper shell is of a dark brown color, oval, compressed above, composed of five vertebral, eight lateral, and twenty-five marginal plates, which are marked by radiating and concentric striæ. A dorsal ridge is produced by the prominent posterior angles of the vertebral plates; the projections of the posterior superior angles of the lateral plates also form, in some specimens, indistinct carinæ. The anterior marginal plates are narrow and oblong; the fifth, sixth and seventh are much wider, while the posterior three plates are marked with strong, concentric striæ, and the posterior angles form strong spinous points. The sternum is yellow, narrow, lozenge-shaped, composed of ten plates, and united to the marginal plates by a long narrow plate, having two smaller plates at its outer extremity. The head is very large, scaly above; eyes large; jaws powerful, hooked; beneath the chin, two warts; neck above, covered with warts or small fleshy cirrhi; beneath, granulated. The legs are large and strong; the fore legs are armed above with large scales, feet with five claws; hind legs with large scales beneath, feet with four claws. Tail, two thirds the length of the body; round at its base, compressed at the sides, tapering to a point; armed above by a ridge of strong pointed spines, diminishing towards the posterior extremity.

The largest living specimen I have seen, was taken at Marshfield; its dimensions were as follows: Entire length, 44 inches, viz. length of the shell, 18

inches; length of the head and neck, when extended, 11 inches; length of the tail, 15 inches. Width of the shell, 15 inches; width across the head, 4 inches.

Cistuda. Fleming.

Generic characters. *Shell gibbous, strong; marginal-plates, twenty-five; sternum oval, covered with twelve plates, bivalve, both valves moveable on the same axis, and joined to each other and to the shell by ligamento-elastic tissue; anterior extremities with five, posterior with four nails.*

C. *Carolina.* Edwards. *The Box Tortoise.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 36, et fig.
Ann. Lyc. N. Y. vol. iii. p. 124.
Harlan's Med. and Phys. Res. p. 149.
Dum. et Bibr. Hist. Nat. des Rept. tom. ii. p. 210.
Bell, monog. Test.

I have received living specimens of this species through the kindness of friends from Barnstable, Amherst, New Bedford, Holmes Hole, and Walpole; and although at neither of these places is it common, yet their distances from each other shows that it is pretty widely distributed throughout the State. This is a *land* species, being found in dry and arid situations, and it can live but a short time in the water. From the circumstance of the sternum being divided into two portions, the anterior of which is moveable, enabling the animal, when disturbed, to encase itself entirely within its shell, the species is generally

known under the name of "*box tortoise.*" Several varieties have been made by naturalists dependent upon the difference of their markings.

A beautiful living specimen before me exhibits the following characteristics:

Length of the specimen, six inches. Shell, round, gibbous, carinated. Sternum bivalvular. The plates of the upper shell are of a dark brown color, sculptured with radiating and concentric striæ, and covered over their entire surface with bright yellow spots, varying in their size, form, and manner of distribution, frequently confluent. A great portion of each marginal plate is occupied by a yellow blotch. The first and fifth vertebral plates, are pentagonal; the second, third and fourth are hexagonal. Of the lateral plates, the posterior are the smaller. The sharp edges of the seventh, eighth, ninth and tenth marginal plates, which are the largest, project outwardly, forming a keel. The sternum is divided unequally, the anterior portion the smaller; it is of a very dark brown color, with dull yellow blotches. The anterior plates of the sternum are triangular; the middle, oblong; the posterior, triangular. These plates likewise exhibit concentric striæ. Head, above, black, reticulated with yellow; the upper jaw of a dull white color, with black lines passing from the eye to its margin. Throat white, with dark spots; flesh on the sides of the neck of a dull horn color, varied with red and brown. The upper jaw has a large hook-like process at its extremity; the lower jaw, a sharp point. Pupil of the eye, black; irides red. The fore legs are covered with large scales of

an orange color, tipped with dark brown; posterior legs of an uniform dark brown color.

The principal food of this species is insects.

C. *Blandingii.* Holbrook. *Blanding's Cistuda.*
N. A. Herpetol. vol. iii. p. 35 et fig.

By the kindness of Mr. Edward Appleton I have received from Haverhill a fine living specimen of this rare species. It presents the following appearance: Length of the specimen, 7½ inches; breadth of the shell, 5 inches; length of the sternum, 7 inches; height 3 inches. Shell oblong, rounded, slightly flattened above. The plates of the upper shell are black, covered with numerous bright yellow circular and oblong spots or blotches, irregularly distributed. The first vertebral plate is pentagonal; the second and third are hexagonal; the fourth is heptagonal; the fifth is octagonal. Of the lateral plates, the anterior and posterior are quadrilateral, the third and fourth, pentagonal. The marginal plates are twenty-five in number; the nuchal plate is very small, about a line in width, and less than half an inch long; the first, third, fourth, sixth, eighth, tenth, and twelfth plates are quadrilateral; the second, fifth, seventh, ninth, and eleventh, pentagonal; the edge of these marginal plates is sharp and entire. The sternum is composed of two valves, the posterior of which, the larger, is oblong, rounded before, emarginate behind; both valves are moveable, and, when closed, they shut the animal entirely, with the excep-

tion of his toes. The sternal plates, twelve in number, are yellow, with large quadrangular dark spots, occupying nearly one half of each plate; the plates are marked with concentric striæ.

The head is nearly black, with yellowish spots. The upper jaw is of a dark brown color, with transverse yellowish lines; the lower jaw is of a bright yellow. The anterior extremities are protected by large imbricated scales in front, with smaller ones beneath, and granulations behind; there are five fingers, which are palmated, with nails. The posterior extremities are larger than the anterior, of the same color, and, like them, having scales and granulations; these extremities are flattened upon the leg and foot, with 5 toes; the posterior only destitute of a nail. Tail cylindrical, gradually tapering to a point.

In regard to this species, Dr. Holbrook, in the third volume of his Herpetology, which is just published, observes: " The sole locality that can at this moment be assigned to the Emys Blandingii, is the prairies in the state of Illinois and the territory of Wisconsin, where they are said to be abundant. The only specimen I have seen came from Fox river, a tributary of the Illinois."

SPHARGIS. Merrem.

Generic characters. *Body covered by a leathery skin, tubercular in the young, perfectly smooth in the adult. Feet without nails.*

S. *coriacea.* Lin. *The leather Tortoise.*

Plate IV.

Pennant's British Zoology, vol. iii p. 7, et fig.
Shaw's Gen. Zoology, vol. iii. p. 77, et fig.
Phil. Trans. vol. lxi. pt. 1. p. 271, et fig.
Dum et Bibr. Hist Nat. des Rept. t. ii. p. 561.

The only specimen I have heard of as having been seen on the coast of the United States, was taken asleep on the surface of the water in Massachusetts Bay, in the year 1824, and being brought to Boston, was purchased by Mr. Greenwood, of the New England Museum, of the captors, for two hundred dollars, and placed in this institution, where it still remains. The naturalist may judge of the great rarity of this species from the following observations by Dumeril and Bibron, in their "*Erpétologie générale ou Histoire Naturelle complete des Reptiles;*" "This species is very rare; it inhabits the Mediterranean, and the Atlantic ocean. Rondelet speaks of a "*Sphargis luth,*" five cubits long, which was taken at Frontignon: Amoreux described another, which was captured in the harbor of Cette; and in 1729 a third was taken at the mouth of the Loire, which was described by Delafout in the "*Mémoires de l' Académie des Sciences.*" Borlase has given a bad figure of a "*Sphargis luth,*" which was taken in 1756 upon the coast of Cornwall, in England."

The specimen in the New England Museum presents the following characters: *Entire length* eighty-five inches; *widest part,* fourteen inches;

back of the head, thirty-four inches; *greatest depth* fourteen inches. The body is covered above, by a dark brown shield, fifty-seven inches in length, of a firm leathery texture, which is divided into furrows by seven longitudinal elevated ridges; all these ridges are noduled, resembling the vertebral column; the dorsal ridge runs the whole length of the shell; those on the side, next the dorsum, commence one inch and a half further forwards than the dorsal ridge, and within sixteen inches of the posterior extremity of the shell curve upwards towards the dorsal ridge, but are not so perceptible after curving, and reach the upper ridge, six inches anterior to the extremity of the shell. The second lateral ridge commences about seven inches back of the preceding, and, at the posterior extremity, curves up like that; the abdominal margin makes the third lateral ridge. The posterior extremity of the shell is truncated, and is two and a half inches wide.

Length of the head and neck, sixteen inches; of the head, nine and a half inches; width of the head nine inches; width of the neck, thirteen inches. Diameter of the eye, large. Nostrils just back of the tip of the snout. A large notch in the middle of the upper jaw, which receives the projections of the lower jaw, when the mouth is closed; on the sides of this median emargination of the upper jaw are two others, one on each side. Upon the middle and posterior portion of the roof of the mouth, strong spinous processes.

A portion of the œsophagus of this specimen belongs to the cabinet of the Boston Society of

Natural History; it is compactly armed with long firm very sharp spines.

Anterior extremities, thirty-five inches long, rounded at the origin, compressed in the middle, tapering to a rounded extremity; in their widest portion, ten inches across.

Posterior extremities, sixteen inches in length; for about half their length, nine inches wide, truncated posteriorly, and, as well as the anterior extremities, bordered upon their posterior margin by a deep fleshy fringe or border.

Length of the tail, thirteen inches; eight inches wide at the base, tapering to a point.

Body beneath, covered by a less firm envelope, of a lighter color.

I am indebted to my friend Dr. Wyman for the accompanying plate of this species.

ORDER II.

SAURIA.

FAMILY.

SCINCOIDEA.

SCINCUS. Daudin.

Generic characters. *Head oblong, pointed, covered with plates; jaws furnished with closely set teeth; two rows of teeth on the palate; tongue fleshy, slightly extensible, emarginate; tympanum apparent; neck as large as the head; body elongated; tail conical; the whole body and tail covered with small imbricated scales; extremities with free and unginculated toes.*

S. *fasciatus.* Lin. *The blue-tailed Lizard.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 241.
Harlan's Med. and Physic Res. p. 138.
N. A. Herpet. vol. iii. p. 45, et fig.

The only specimen of this beautiful species I have known to be found in New England, was captured in Barre, by Dr. Joseph N. Bates of that place, and kindly loaned me to identify and describe. He took it, he writes me, "in a mud hole; it evaded my attempts to capture it for some time on account of its agility and cunning, and when captured made much resistance with jaws, claws, &c."

Length of the specimen five inches; elongated,

covered above with longitudinal rows of imbricated scales; color above, a deep shining black, with five longitudinal deep golden yellow lines; abdomen, of a light yellow color; tail, a deep sky blue, blended with yellow and black lines, which run longitudinally along the back.

A yellow line, commencing over each nostril, passes obliquely backwards, and, approaching each other, they unite at the distance of rather more than a quarter of an inch back of their origin, forming a dorsal line, which, continued the whole length of the body, is lost upon the tail; on each side of this dorsal line, runs another, which arises at the superior anterior angle of the eye, and terminates like the preceding; beneath this, is still another, commencing at the snout, interrupted only by the meatus of the ear, and continued, like the others, upon the tail. These yellow lines give the back the appearance of being divided into yellow and black longitudinal lines. Head, half an inch long; one quarter of an inch wide; with large plates above. Eyes, small. External meatus of the ear, vertical, large. Anterior feet short, with five toes, each armed with a sharp nail. Posterior extremities, large; second toe very much elongated, and all the toes, like those of the fore feet, nailed.

Extremities above, of a brown color, having a longitudinal yellowish white line running along their posterior portion to the toes.

The vent is transverse, situated just back of the interior of the thighs. Tail longer than the body, its posterior portion a deep blue.

The species feeds upon insects.

ORDER III.

OPHIDIA.

FAMILY.
SERPENTIA.

COLUBER. Lin.

Generic characters. *Body long, cylindrical and tapering; head oblong, covered above with smooth polygonal plates; above covered with rhomboidal scales, imbricate, reticulated, or carinated, or smooth; abdomen with transverse plates; beneath the tail, with double plates; anus transverse, simple; jaws furnished with sharp teeth; without poisonous fangs. Some species oviparous, others ovo-viviparous.*

C. *sirtalis.* Lin. *The striped Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 535.
Harlan's Med. and Phys. Res. p. 116.

This pretty species, generally known as the *striped snake*, is our most common snake. The usual length is about two feet; occasionally it is met with two feet and a half long. The upper part of the body is of a dark olive brown color. A narrow yellow band extends from the occiput to the extremity of the tail; on each side of this, joining the abdominal

plates, is a somewhat broader parallel band of the same color. The brown color of the back is variegated with black blotches, which are much more strongly marked in the smaller specimens; in the larger specimens, they are hardly discernible, unless the scales be slightly separated by the observer. Abdomen greenish; its upper portion towards the sides, lighter; the posterior edge of the abdominal scales, at their union with those of the sides, marked with a black spot; at the distance of one or two lines within this spot, towards the centre of the abdomen, another spot is observed, which in young specimens is equally dark with the former, but duller in old specimens. Scales oblong, strongly carinated; smaller upon the back of the head and the upper anterior portion of the body, than farther back. Scales of the yellow lateral lines, larger than those of the olive colored back. The scales that are shortest, least carinated, and at the same time the largest, are in a single row between the abdomen and the lateral line referred to. Head flattened, having upon its top ten plates; one at the snout, two pairs behind this, three between the eyes, and two, larger than either of the preceding, upon the occiput. Pupil of the eye, black; iris, reddish. Upper jaw margined on each side by seven plates, besides that at the tip; the fifth, situated directly beneath the posterior angle of the eye, the largest. Lower jaw bordered by ten plates on each side. Two pairs of plates upon the throat, very much elongated. Small teeth in the jaws and upon the palatine bones.

The bright yellow color, which renders this a

beautiful species when alive, changes to a dull greenish yellow after being immersed in spirits; in this state, it appears to have been described by Herpetologists. When the scaly cuticle is removed, the dorsal line beneath is found to be white; and the sides of the back are of a deep blue color, with two rows of black, nearly circular blotches. Sometimes the line on the back is a greenish white, while the lateral bands are yellow. Upon the occipital plates of one of my specimens are two small yellow spots towards their middle at their interior edges. The brightness of the lateral lines disappears at the anus; beyond, the color is greenish, and this is gradually lost towards the tail.

Linnæus describes his species as having 150 abdominal plates, and 114 caudal scales; Shaw copies this in his "*General Zoology.*" Harlan makes 150 plates, and 60 caudal scales. One specimen before me, has 154 plates, and 75 scales; a second specimen has 146 plates, and 63 scales.

This species feeds upon *frogs* and *toads*, and is frequently found enormously distended by having swallowed one of a very large size.

C. *ordinatus.* Lin. *The little brown Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 497.
Harlan's Med. and Phys. Res. p. 113.

This is also quite a common species with us, growing to the length of two feet. The color above, is a browish ash, with a broad, lighter ash-colored

longitudinal band upon the dorsal ridge, running the whole length of the animal; on each side of this dorsal band, a row of small dark brown spots. Body beneath, fawn-colored; of a darker tint upon the sides. A row of very minute black dots upon the outer edge of the abdominal plates. Scales small, carinated; a row of scales larger than the rest, upon the sides, joining the abdominal plates. Head very small, flattened above; with ten scales upon its top, the two upon the occiput, and that directly in the middle of the top of the head, the largest, and black; the others are quite small, and of the color of the back; these scales are arranged as follows: Two triangular ones upon the occiput; a third, hexagonal in its form, in front of them; its posterior portion, between the anterior inner portion of the former, making the top of the head; on each side of this, protecting the top of the eye, a small oblong scale, rounded upon its outer edge; in front of these, immediately back of the eye, two pairs of quadrangular scales; the posterior, larger. A single large scale forms the snout. Besides these scales, three are seen in front of the eye, on the side of the head; and quite a large scale back of the posterior angle of the eye, separated from it by two very minute scales only. Upon the margin of the upper jaw, fourteen scales; upon the edge of the lower jaw, twelve, besides the tip. An oblique black band passes downwards across the angle of the jaws, and a transverse one back of the occiput, crosses the neck on each side; in some

specimens, all the scales upon the upper jaw are edged with black.

Sometimes the spots on the sides of the abdomen are very distinctly seen; in others, as in several specimens lying before me while I write, they are scarcely observable.

When preserved in spirit, the longitudinal dorsal line becomes lighter colored, and the abdomen changes to a yellowish green color.

The abdominal plates are 128; the caudal scales 62 and 64.

In the stomach of this species, I have found fragments of insects.

C. *vernalis.* Dekay. *The green Snake.*

Harlan's Med. and Phys. Res. p. 124.

One of our most beautiful species, this snake is generally well known. A fine living specimen before me, twenty-one inches in length, exhibits the following characters:

Above, of a beautiful grass green color; beneath, a yellowish white. Length of the head, half an inch; greatest width of the head, a quarter of an inch; head flattened above; ten plates upon the top of the head; one at the snout; two pairs immediately back of this; three plates between the eyes; two large plates upon the occiput. Upper jaw bordered by fourteen scales. Nostrils circular, just back of the posterior lateral angle of the snout. Pupil of

the eye, black; iris cupreous. Scales rhomboidal, smooth, not carinated. Tail six inches in length, gradually tapering to the point.

Four specimens vary in their plates and scales as follows:

One specimen has	137 plates;	85 caudal scales.			
A second	"	132	"	80	" "
A third	"	133	"	81	" "
A fourth	"	127	"	84	" "

Like the preceding species, this feeds upon insects.

C. *punctatus*. Lin. *The ringed Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 553.
Harlan's Med. and Phys. Res. p. 117.
N. A. Herp. vol. ii. p. 115, et fig.

This pretty species is less common than either of the preceding, being usually found concealed beneath the bark of decaying trees. The specimen before me is fourteen inches in length; the body is elongated, with smooth scales. Color above, of an uniform bluish brown; beneath, of a reddish yellow, with a longitudinal row of black spots upon each side of the abdomen, where the abdominal plates and lateral scales unite; a third row of similar spots runs longitudinally along the middle of the abdomen, as far as the vent, beyond which they are not visible. Ten plates upon the top of the head; sixteen plates, beside that at the tip, border the upper jaw; and fourteen, margin the lower. Head half an inch long, one quarter of an inch wide; flattened above; rather lighter colored than the body. Nostrils large. Eyes

of moderate size; pupils black, irides grayish. A broad yellowish white band crosses the occiput. Tail, three inches in length, tapering to a point. The abdominal plates are 156, and the caudal scales 56. A second specimen exhibits 156 plates, and 62 scales.

C. *constrictor.* Lin. *The common black Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 464.
Harlan's Med. and Phys. Res. p. 112.

In some parts of the State, this is not an uncommon species, frequently growing to the length of six feet. A fine specimen, fifty-one inches in length, serves for the following description: Length of the head, one and a half inches; greatest width of the head, half an inch. Body, above, almost black; beneath, slate-colored; neck, margin of the jaws, and snout, yellow. Plates upon the top of the head, very large; that at the snout, convex, projecting, yellow, bordered with black at its upper and lateral margins; the first pair of plates, nearly quadrangular; the second, pentagonal; of the three between the eyes, the middle, which is largest, is hexagonal; those at the sides of this, over the eyes, are pentagonal; the two posterior plates, pentagonal. Sixteen plates border the upper jaw. Eye large. Nostrils large, vertical, situated between the second and third plates, back of the snout. Three pairs of elongated plates on the throat, just back of the chin; back of these plates, two pairs of smaller plates anterior to the abdominal plates. The whole back

covered with large rhomboidal smooth scales. Body somewhat compressed at the anterior extremity; cylindrical at the posterior, gradually tapering to the tail, from which it more suddenly becomes smaller, and terminates in a point. Length of the tail, eleven inches.

The abdominal plates are 184; the caudal scales, 85.

This species is generally met with in wild and unfrequented places; it is avoided as venomous by many, although perfectly harmless. It feeds upon the *toad*, and several species of *frogs;* oftentimes it catches *small birds.* Mr. Erastus H. Clap informs me that he saw one that had swallowed a common sized specimen of the *Robin*, "*Turdus migratorius*," entire; it is said also to prey upon the different species of *meadow mice.*

C. *amaenus.* Say. *The red Snake.*

Journal Acad. Nat. Sciences, vol. iv. p. 237.
Harlan's Med. and Phys. Res. p. 118.

A single specimen of this species has been received from Professor Adams, who found it at Amherst. This specimen being preserved in spirits, and its natural character somewhat affected thereby, I avail myself of the very accurate description of Say:

"Body above, reddish brown; beneath, vivid red; head not larger than the neck, obtusely rounded before; terminal plate curving a little on the top of

the head, so as to be nearly horizontal above; first pair of plates rather short, breadth decidedly more than double the length; second pair rather large, oblique, posterior outer angle reaching the eyes; central plate convex, rounded; subtri-angular, wide before and angulated on the anterior middle, posterior angle acute; posterior plates a little convex, with a single scale between their tips; eyes with one scale behind, one before twice as long as the posterior one, small plate above the eye less than half the length of the central plate, and not twice as large as the posterior eye plate; teeth minute; scales smooth, polished, somewhat opalescent, slightly convex, rounded at the tip; tail less than one seventh the whole length; tip rather abrupt, conic, solid, acute.

Plates, 124; scales, 25. Total length, ten inches and three tenths; tail, one inch and two fifths.

Var. a. dark slate color above.

A pretty and perfectly harmless serpent. The contrast of color between the lively red, sometimes rosaceous, of the inferior surface of the body, and the brown, more or less deep, of the superior surface, is very striking; the abrupt termination of the tail and the narrow head, are also distinguishing traits. It is found beneath stones and prostrate logs, but not very frequently."

My specimen is seven inches long; tail, one inch; abdominal plates, 136; caudal scales, 32.

C. *eximius*. Dekay. *The chicken Snake.*

Harlan's Med. and Phys. Res. p. 123.

This not very uncommon species, is known by the names of *house snake; thunder and lightning snake; chicken snake; milk adder;* and *chequered adder.* It is one of our largest species, measuring sometimes five feet or more in length; and is a beautiful snake. A specimen thirty-four inches in length, furnishes the following description: Body elongated, varying very little, in its circumference anterior to the tail, but back of the vent, rapidly terminating in a point; all the upper portion of the body covered with smooth rhomboidal scales. Body, above, of a dark brown color, with numerous transverse white bands, which become confluent on the sides; the brown portions of the back between these transverse bands, irregular in their form, and margined with black; blotches of a similar color with the back, along the sides. Abdomen yellowish, variegated with quadrangular black spots. Circumference of the head less than that of the body; length of the head, one inch; width across the head, half an inch. The plate at the snout large, with a well marked emargination beneath; the first pair of plates moderate in size, quadrangular; the second pair of plates also quadrangular, and much larger; the central plate on the top of the head, large, pentagonal; those upon the sides of this, irregularly quadrangular; occipital plates very large. Fourteen plates margin the upper jaw; sixteen plates edge the

lower; these plates on the jaws are yellow, margined with black. Eyes moderate in size; from their posterior angle, a black band passes obliquely backwards. Upon the neck, seven longitudinal plates, between the chin and the abdominal plates; the anterior three, largest; the second, larger than any. Length of the tail, four inches.

The abdominal plates are 207; caudal scales, 48.

This species feeds upon toads and frogs.

C. *sipedon.* Lin. *The water Adder.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 496.
Harlan's Med. and Phys. Res. p. 114.

Large numbers of this species are found in mowing meadows which are overflowed a part of the season; it is frequently killed at Cambridge, four feet and more in length; its body being the size of a man's wrist. By many it is avoided, as being poisonous in its bite. The body is large; its circumference lessening but little, anterior to the vent; rapidly tapering posterior to the vent; of an uniform dark brown color above; reddish upon the sides; abdomen yellowish white, mottled with dark brown; beneath the tail, nearly black. Whole upper part of the body covered with rows of elongated, strongly carinated scales; these carinæ, more obvious upon the posterior extremity; nothing peculiar in the arrangement of the plates upon the head; the ten plates upon the top of the head, of moderate size; sixteen plates upon the upper jaw; eighteen plates upon the

lower jaw. Eyes prominent. Nostrils of moderate size.

The abdominal plates are 139 ; caudal scales 72.

In a young individual lying before me, seventeen inches in length, with the same number of abdominal plates and caudal scales with the above described specimen, the back is crossed transversely by a large number of yellow bands, and the scales on the tail are so strongly keeled, as to produce well marked grooves between the rows of scales.

This species feeds upon frogs.

C. *saurita.* Lin. *The riband Snake.*

Shaw's Gen. Zoology, vol. iii. pt. 2. p. 532.
Harlan's Med. and Phys. Res. p. 115.

This beautiful little snake is not very common; it resembles somewhat the *sirtalis*, but it is smaller, lighter colored, and much more graceful in its figure and proportions. Its form is very slender, tapering to an acute point. Above, dark brown, with three longitudinal stripes of a greenish white color, which are very distinct as far as the vent, back of which they are insensibly effaced; both sides of the dorsal line, and the upper edge of the lateral lines, margined with black. Whole length of the specimen before me, ten inches; length of the tail, three and a half inches. The scales upon the top of the head are moderate in size; fourteen upon the upper jaw, twenty upon the lower jaw. Eyes rather large.

The abdominal plates are 162 ; caudal scales 112.

C. *occipito-maculatus*. Nobis. *The spotted-necked Snake.*

This pretty species, which I suppose to be undescribed, was received from Professor Adams, who found it at Amherst. It was sent me in spirits, and therefore it is probable that its colors had somewhat changed. Its length is ten inches and a half; length of the head, less than half an inch; width across the head, two lines. Body elongated, covered with longitudinal rows of pentagonal scales, connected, and at their posterior extremity, slightly fissured. All the upper portion of the body, a light ash or gray color. An indistinct band of a lighter color passes longitudinally down the back; this is margined on each side with a row of dark colored, almost black scales; on each side of the body, a row of larger scales than those upon the back, unite the back with the abdominal plates; these scales are black, with a longitudinal delicate white line passing through their centres. Abdomen yellowish white, with black or fuliginous markings upon the outer edge of the plates, appearing upon the anterior plates like black dots. Circumference of the neck less than the remainder of the body; body largest just anterior to the vent; back of the vent it rapidly approaches a point. The five anterior plates upon the head, viz. that at the snout, and the two pairs immediately posterior to this, yellow; the other plates the color of the back, variegated with

white. Twelve plates upon the upper jaw, besides that at the snout; fourteen plates margin the lower jaw, besides that at the chin. Three large white irregularly formed blotches, directly back of the occipital plates; one above, and one on each side of the first.

There are 124 abdominal plates, and 38 caudal scales.

Inasmuch as the "*punctatus*" sometimes exhibits merely a *spot* upon the occiput, instead of a circular band, the superficial observer might think *that*, and the species I have just described, as identical; a little attention will show the marked differences between them.

Heterodon. Palisot de Beauvais.

Generic characters. *Plates and scales as on the Colubri; the rostral plate a trihedral pyramid, with a ridge above, and pointed at the tip; posterior maxillary teeth largest.*

H. *platirhinos.* Latreille.

Daud. Hist. Nat. des Rept. tom. vii. p. 153.
Harl. Med. and Phys. Res. p. 120.
N. H. Herpetol. vol. ii. p. 97, et fig.

I have never seen a specimen of this animal; but Dr. Holbrook assures me he possesses an individual which was captured at Medfield. His description therefore is here introduced: "The head is large, flat, triangular, broad behind, with the snout pointed

and elongated at the tip; it is covered with scales on the posterior part, and with plates on the anterior and on the vertex. The vertical plate is regularly pentagonal, with its broadest point directed forwards. The superior orbital are quadilateral, elongated, and broadest posteriorly, with their outer margins projecting over the eye, which gives a sinister look to the animal. The occipital plates are rhomboidal. The frontal are quadrilateral, with their anterior inferior angles very much prolonged; the anterior frontal are triangular, with their bases directed inwards, and their apices rounded, and turned to the nostrils. Between these frontals, so as to prevent them coming in contact with each other, is a narrow elongated azygos plate, reaching from the posterior frontal to the rostral plate, with a ridge on its upper surface, continuous with that of the rostral plate. The rostral plate is triangular, with its basis below and the apex very pointed above, and recurved, with a strong carina or ridge on the upper surface. The nostril plates are two on each side; the anterior quadrilateral, lunated on the posterior margin, with its anterior and inferior angle greatly prolonged; the posterior is narrow, and concave in front to complete the nostril. There are twelve orbital plates, the superior of which have been already described. Besides these there are three anterior orbital plates, which are quadrilateral, the largest being above; the inferior orbital are five, and the posterior orbital three in number, all of which are quadrilateral. The upper jaw has six lateral plates, quadrilateral, and increasing in size to the sixth, which is largest.

The nostrils are very large, near the snout, and lateral. The eyes are large, the pupils dark, the iris light gray. The neck is nearly the size of the head when he is quiet, but when roused or irritated he flattens it to more than twice its ordinary breadth. The body is elongated, thick, rounded above, but flattened at the abdomen, covered with scales strongly carinated above, the three inferior lateral rows being ecarinate, and with plates below. The tail is long, narrow, and terminating in a point, with scales or bifid plates on its under surface.

Color. The head above is dusky, with a light band between the orbits; behind the occiput is a dark spot; a dark band begins at the back of each nostril, which increases in size as it descends, and forms a large blotch on the side of the neck. The body is olive-brown, or sometimes brownish yellow, and marked with a triple series of black or dark gray spots; those of the vertical series being subquadrate and elongated transversely; the spots of the lateral rows are rounded, and many of them correspond with those of the vertebral line, while others alternate with them. Sometimes the spots of the lateral and vertebral lines are confluent, so as to give the appearance of bands.

Dimensions. Length of the head, 1½ inches; breadth of the head, when not disturbed, 1 inch; length of the body, 27 inches; length of the tail, 5 inches; circumference of the body, 4½ inches. In the individual here described, there were one hundred and forty-four abdominal plates entire, and two bifid plates near the vent; and forty-two pair of subcaudal scales."

CROTALUS. Lin.

Generic characters. *Head large, triangular, rounded in front, covered with plates anteriorly; vertex and occiput with scales; a deep pit between the eye and nostril; upper jaw armed with poisonous fangs; body elongated, thick; tail short and thick, terminating in a rattle, which is a corneous production of the epidermis; plates on the abdomen, and under the tail.*

C. *durissus.* Kalm. *The banded Rattle Snake.*

Turton's Linnæus, vol. i. p. 672.
Shaw's Gen. Zoology, vol. iii. pt. 2. p. 317, et fig.
Harlan's Med. and Phys. Res. p. 132.
N. A. Herpetol. vol. iii. p. 81.

This species, which is generally known in New England as the *rattle snake*, is extensively distributed throughout the State. Two fine specimens, taken at Douglas the last summer, gave me an opportunity for minute observation. One of them measured three feet and one inch in length, and was five inches in circumference; the other was three feet long. From the former, I drew up the following notes:

Upper part of the body, of a yellowish brown color, with rhomboidal black spots continued along the back, margined with bright yellow; upon each side of these rhombs a black band is continued to the sides of the body, where it terminates in an irregularly quadrate black spot; tail black. Body,

beneath, yellow, with fuliginous dots and blotches distributed irregularly over its surface. Scales on the back elongated, carinated ; scales upon the sides larger, carinæ less prominent. Length of the head, one inch and a half ; width of the head, one inch. Top of the head, flattened ; scales upon the top, small ; on the sides of the head, large, pentagonal ; on the edges of the jaws, quadrangular. Snout, terminated by one large plate ; a quadrangular plate on each side of this ; directly back of these, a smaller one, in which are the circular nostrils, situated obliquely, pointing forwards. Directly above the two lateral plates, two others are situated ; the first, meeting the snout anteriorly, and the second, extending some distance beyond the nostrils behind. At the anterior angle of the eye, a large plate, separated from the nostrils by two quite small plates, at the anterior inferior angle of which, is the aperture for the poison. A large plate over the eyes. Two plates much larger than the others, upon the throat.

The rattle is composed of six corneous portions. The other specimen has eleven rattles. The abdominal plates are 170 ; caudal plates, 24.

Although the poison of this species is very virulent, an accident is seldom known to occur ; proving its unwillingness to be the aggressor, and that the fangs are used only as weapons of defence, after sufficient warning has been given of its presence, by the *rattles.*

The general impression that a rattle is added annually is incorrect. Dr. Holbrook observes, " It is now certain that rattle snakes have been known to

gain more than one rattle in a year, and to lose in proportion, the exact number being regulated no doubt by the state of the animal as to health, nourishment, liberty, &c. I have known two rattles added in one year, and Dr. Backman has observed four produced in the same length of time."

The power of fascination attributed to this genus, is too absurd to require our serious consideration.

ORDER IV.

BATRACHIA.

Rana. Lin.

Generic characters. *Body covered with a smooth skin; upper jaw furnished with a row of minute teeth; another interrupted row in the middle of the palate; no post-tympanal glands; posterior extremities long, and in general fully palmated; fingers four; toes five in number.*

R. *pipiens.* Lin. *The Bull-frog.*

Shaw's Gen. Zoology, vol. iii. pt. 1. p. 106, et fig.
Harlan's Med. and Phys. Res. p. 101.
N. A. Herpetol. vol. iii. p. 81, et fig.

This is by far our largest species of frog; it inhabits ponds, ditches, and pools of stagnant water, but is not common in this portion of the State.

A specimen lying before me, twelve inches in length, serves for my description. Greatest width nearly three inches. Color above, a light green, with sparse dusky spots upon the back; head green. Sides of the body, brownish; beneath, white; throat yellow. Legs, more or less barred with dull transverse bars. Fore legs, including toes, three inches in length; above, of a dull greenish brown color,

with indistinct brownish transverse bands; beneath, white; four toed, that next the outer, the largest, each with three small tubercles at the joints of the phalanges. Posterior extremities, seven and a half inches long, of a similar color with the anterior extremities; the upper anterior half of the thighs barred with brown bands; the upper posterior portion, greenish brown, with an intermixture of a duller brown color, with small white spots or blotches; legs with four transverse brown bands; indistinct bands on the feet; five toed, that next the outer, much the largest, being two and a half inches in length; toes palmated; and tubercled like the toes of the anterior feet; at the base of the little toe, is a prominent projecting carina along the edge of the phalangeal ridge of the largest toe; a row of yellow dots run to the second phalanx.

Length of the head, one inch and a half; width across the tympanum, two inches. Eyes prominent, large; pupils black; irides greenish yellow; distance between the eyes, three lines. Snout obtuse and yellowish, as well as the margin of the upper jaw. Nostrils about a line in length, situated obliquely, half way between the tip of the snout and the eye, appearing like two small black points. Tympanum half an inch in diameter, plane, looking like a large scale fastened to the head; just within its outer margin, a brownish circular ring; within this ring, greenish. Mouth large; numerous small sharp teeth in the upper jaw. Tongue large, fleshy.

In the stomch of this specimen, taken in Muddy Pond, Roxbury, I found five specimens of the "*Helix albolabris*," with the contained animal; one only was perfect, the others being more or less digested; this specimen measured one inch in its greatest diameter, and was five lines in height.

This species usually feeds upon frogs and insects, and the farmers assert that it sometimes robs them of their chickens.

R. *fontinalis.* Leconte. *The Yellow throated green Frog.*

Ann. Lyc. N. Y. vol. i. p. 282.
Harlan's Med. and Phys. Res. p. 103.
N. A. Herpet. vol. iii. p. 85, et fig.

This species appears very early in the spring, and continues extensively distributed throughout the season. It may be at once recognised by its greenish color, and yellow throat. Length of the specimen before me, three inches; length of the posterior extremities, four inches and a half. Head and upper part of the anterior portion of the body, of a brilliant green color; posterior portion of the body slightly maculated, greenish, mixed with brown; sides granulated, brown; mottled with irregularly formed and distributed black blotches, beneath the throat, yellowish; abdomen white. Head one inch long; snout blunted and yellowish at the extremity. Eyes very prominent; pupils black; irides metallic, encircled by a brilliant golden ring. Nostrils nearer to the eyes than to the mouth.

Gape of the mouth large, upper jaw with many minute teeth. Tympanum plane, circular, rust colored; four lines in diameter. From the posterior angle of the eye a cuticular fold extends just over the tympanum, along the edge of the back on each side, to the posterior part of the body.

Anterior feet fawn colored above, with several indistinct transverse brownish bands; a dark colored band along the posterior edge of the leg, extending on to the sole of the foot. Feet four toed.

Posterior extremities of a darker brown color than the anterior; thighs with indistinct bars upon their outer portions; buttocks covered over their whole surface with irregularly distributed black blotches; beneath, a dull white; legs and feet, same color as the extremities of the thighs. Feet five toed.

R. *halecina.* Kalm. *The Leopard Frog.*

Shaw's Gen. Zoology, vol. iii. p. 105.
Journal Academy Nat. Sciences, vol. v. p. 337.
N. A. Herpet. vol. i. p. 89, et fig.

This most beautiful species, called by Kalm the *shad frog*, from its appearing in Pennsylvania in the spring of the year, with the *shad*, is better known in this state as the *leopard frog*, from its ocellated appearance. It is exceedingly well marked, and considered by all a very pretty animal.

The upper part of the back, and external side of the limbs, brassy, with a metallic lustre. Upper surface of the body, marked with large distinct irregu-

lar spots or blotches which have a brownish centre, a black circumference blending with each other, and a bright green halo; generally there are two longitudinal rows of these blotches, which are continued the whole length of the body; sometimes these spots are very regular, at other times, a third row may be seen, or the two will have become confluent at their inner sides, or the spots in the same row will have united with each other. Throat and abdomen white. Eyes prominent; pupils black; irides golden. On each side of the back, an elevated bronze colored ridge passes from the eyes to near the extremity of the body. A similar, but smaller ridge runs from the anterior angle of the eye to the snout. On the outer side of the thighs, legs and tarsus, the blotches are long, irregular, but arranged transversely, having the appearance of bands. Buttocks and posterior surface of the thighs granulated and mottled with black. Upper surface of the body finely corrugated with several irregular cuticular folds, arranged longitudinally on the back. Throat and belly smooth. Feet palmated; the fourth toe much larger than the others. All the fingers and toes, with tubercles on the inner surface of the joints. The body of this species seldom exceeds four inches in length.

This frog is generally found in damp places, a short distance from water; although, being a great leaper and hence enabled to reach its wonted situations with ease, it is occasionally met with at considerable distance from any pond or brook.

R. *palustris.* Leconte. *The Pickerel Frog.*

Ann. Lyc. N. Y. vol. i. p. 282.
Harlan's Med. and Phys. Res. p. 105.
N. A. Herpet. vol. i. p. 93.

Although Leconte applied the specific name of "*palustris*" to this quite common species, on account of its being found near salt marshes, it is as frequently, in this vicinity at least, met with about the margins of fresh water brooks and ponds, as in any other situations. It is a prettily marked species, but much less brilliant in its colors than the preceding.

The largest specimen I have met with, measured three inches in length; and the posterior extremities were four inches and a half long. Color above, cinereous; abdomen white; interior of the limbs and lower part of the flanks, yellow. Upon the back, two longitudinal rows of dark brown spots, which are generally square, sometimes nearly circular; in some specimens, these become confluent and produce an elongated band; in the same specimens, both square and circular spots may occasionally be observed. Between the back and sides, a broad yellowish brown band is seen, commencing at the eyes, and extending the length of the body. Two rows of smaller spots of a similar appearance with those on the back and sides. Snout, pointed. Eyes rather prominent; pupils, black; irides, golden. Tympanum, small, color of the back; a dark colored line extends from the snout to the eyes, a roundish

spot on the upper and inner side of each orbit, one on the top of the head, and a smaller one below each nostril. Thighs, legs, and tarsus, striped transversely with broad dark bands or oblong spots; arms irregularly spotted. Back, smooth; flanks slightly tuberculated; buttocks, granulated; fleshy tubercles on the lower surface of the toes at the joints.

R. *sylvatica*. Leconte. *The Wood Frog*.

Lyc. Nat. Hist. N. Y. vol. i. p. 282.
N. A. Herpet. vol. i. p. 95, et fig.

This beautiful species is not often met with, inhabiting as it does damp and thick woods; occasionally it is seen at a great distance from any water, and is very difficult to be taken on account of its agility in leaping. It is rather smaller than the "*palustris*," and presents the following characters: above, of a reddish brown color, resembling a dried dead leaf; sides, variegated with green and yellow; abdomen, white; under part of the arms and posterior extremities, lighter colored than the back. Snout, blunted. Eyes, prominent; pupils, black; irides, golden. A broad black band, narrow at its origin, wider at its posterior portion, extends from the snout to the shoulder: this band passes through the centre of the eye, including within it, the tympanum; margining the lower edge of this band, is a deep yellow line running its whole extent. Extremities above, rather lighter than the back; the anterior extremities are seldom banded; the posterior extrem-

ities, crossed by transverse dark colored bands. Anterior extremities, four toed; posterior, five toed.

Like the three preceding species, this frog feeds principally upon insects.

Hylodes. Fitzinger.

Generic characters. *Mouth furnished with a tongue, teeth in the superior maxillary and palatine bones; tympanum, visible; extremities slender, tips of the fingers and toes terminating in slightly developed tubercles.*

H. *Pickeringii.* *Pickering's Hylodes.*

N. A. Herpet. vol. iii.

Rev. John L. Russell, of Salem, showed me the only specimen of this species I have ever seen, which was captured by Dr. Nichols, in Danvers. Having no opportunity to describe it myself, I extract the following account from the pages of the "Journal of the Essex County Natural History Society."

"Above, fawn color, changeable to dark cinereous; marked with two transverse narrow black lines, forming a cross, and an irregular narrow line on each side, producing, with the other lines, a general rhomboidal configuration; a large triangular spot on the back of the head, formed by the junction of lines proceeding from the centre of the irides; a spot at the insertion of the fore legs; a pale yellowish line margined with black, bounds the back

part of the fore and hind legs; an irregular spot on the extremity of the rump; beneath, granulated on the abdomen, legs and thighs; a character also perceptible in some degree, on the upper surface. Head rather obtuse; lower lip whitish; throat, clavicle, and auricles, minutely spotted with black dots; irides golden copper. When resting on a dark substance, it changes at pleasure to a dark ashen hue, the lines becoming black and prominent, and the spots on the head and rump very perceptible, as also the transverse bars on the upper surface of the legs. Length of the body from the snout, to the vent, one inch; of hinder thighs and legs, each half an inch; of tarsus and toes, seven tenths of an inch; of the largest toe, four tenths of an inch. Whole length of the fore legs, half an inch."

HYLA. Laurenti.

Generic characters. *Body in general elongated; upper jaw and palate furnished with teeth; tympanum apparent; no post tympanal glands; fingers long, and with the toes terminating in rounded viscous pellets.*

H. *versicolor*. Le Conte. *The common Tree Toad.*

Ann. Lyc. N. Y. vol. i. p. 281.
Harlan's Med. and Phys. Res. p. 109.

As the *tree toad*, this species is commonly known throughout New England, from the circumstance of its being more generally found upon trees than in

any other situation; its color conceals it admirably, and it often eludes a careful search on account of its similarity to the object upon which it may be resting. A specimen two inches in length, exhibits the following appearances. Above, of a light ash color, with a brownish cruciform marking between the shoulders, and smaller irregularly formed blotches distributed over various parts of the back; beneath, white, granulated, with a yellowish tint at the posterior portion of the sides. Head, broad; snout, blunt. Eyes, large; pupils, black; irides, golden. Extremities ash colored above. Anterior extremities with a small number of brown markings; beneath, white and brownish; four fingers free, terminating in pellets. Posterior extremities transversely barred; beneath, granulated, yellowish white, becoming yellow near the abdomen and upon the legs; five toes, terminating, like the fingers, in pellets.

An acrid secretion protects the skin of this species from its enemies. Its principal food is insects.

H. *squirella.* Bosc. *The little peeping Hyla.*

Ann. Lyc. N. Y. vol. i. p. 279.
Harlan's Med. and Phys. Res. p. 107.
N. A. Herpet. vol i. p. 105.

The only specimen I have seen of this species was in a dried state; its colors were destroyed and its proportions much changed from life. I have therefore no hesitation in copying the description and observations of my friend, Dr. Holbrook, as published

in the first volume of his "*North American Herpetology*:"

"*Characters.* Body olive green above, marked with dark brown blotches irregularly disposed; a transverse dusky band between the orbits; whitish beneath and granulated; head short, with a white line extending along the upper lip to the shoulders.

Description. The head is short, with a dark band between the orbits, the line from each orbit being directed backwards so as to meet at an angle; the snout is obtuse, with an indistinct dark band extending from the nostrils to the eyes, below which is a white line along the margin of the upper lip, reaching to the shoulder; the lower jaw is almost white; the nostrils are placed near the extremity of the snout; the eyes are prominent; the pupils black; the irides golden; the tympanum is bronzed and surrounded by an indistinct circle of dark brown. The skin is smooth; the body short and depressed while living; the back is olive green, with irregular blotches of darker olive; the flanks are gray. The inferior surface of the body is granulated, greenish white in front, with a few dark spots at the throat; the posterior part of the abdomen is darker. The anterior extremities are olive green above, with occasional spots of brown, and flesh colored beneath; the fingers are four in number, distinct, and each terminating in a viscous pellet. The posterior extremities are long, green above, obscurely blended with dark brown, and flesh colored beneath, tinged with yellow externally; the lower surface of the thigh is granu-

lated; the toes are five in number, and semi-palmated.

Dimensions. Length of the body and head, 1 1-4 inches; of the thigh, 4-5ths of an inch; of the leg, 4-5ths of an inch; of the tarsus and toes, 9-10ths of an inch.

Geographical distribution. Its most northern limit must be considered as lat. 34°; we have no evidence of its being found farther north. It abounds in South Carolina, Georgia and Florida; how far west of these States it may exist cannot at present be determined.

Habits. This animal is found on trees, often seeking shelter under the bark of such as are decaying; it frequently chooses old logs for its place of hybernation. In fine weather and after showers, it climbs even the highest trees in search of insects.

General remarks. The colors of this animal are even more changeable than in any species with which I am acquainted. I have seen it pass in a few moments from a light green, unspotted and as intense as that of *Hyla lateralis*, to ash color, and to a dull brown with darker spots; the spots also at times taking on different tints from the general surface. The markings, too, vary exceedingly in different individuals, the white line on the upper lip and the band between the orbits alone presenting some constancy. Daudin remarks that the leg is "shorter than the thigh;" we have found them nearly equal in length, and this character is by no means so conspicuous as in *H. versicolor*.

Daudin first described this animal, and gave a

figure of it, from a drawing furnished him by Bosc. Leconte has given the latest and most detailed account of it, establishing three principal varieties, in one of which the spots, as well as the yellow on the thighs, disappear altogether."

The specimen I possess was captured in Roxbury.

Bufo. Laurenti.

Generic characters. *Head, short; jaws without teeth; tympanum visible; behind the ear is a large glandular tumour, having visible pores; body short, thick, swollen, covered with warts or papillae; posterior extremities but slightly elongated.*

B. *Americanus. The common Toad.*

Harlan's Med. and Phys. Res. p. 109.
N. A. Herpetol. vol. i. p. 75.

This very common species is beginning to be looked upon by the horticulturalist in the light of a benefactor, and by many is carefully preserved on their grounds for the benefits it affords them by feeding upon noxious insects.

A fine specimen, three inches in length, furnishes the following description: Greatest width, two inches. Body, brownish, mottled with black blotches; its whole upper surface covered with prominent tubercles; those upon the back, larger; beneath, granulated, yellowish, sprinkled with black spots. Head large; superciliary ridges prominent; tympanum small, light colored, with an irregular

darker colored black marking within its circumference. Mouth, large. Post tympanal glands large, equal in length to the distance between them. Eyes large; pupils black; irides beautifully reticulated with black and golden; eyelids tuberculated. Between the eyes, on the top of the head, a yellowish white line commences, which terminates at the posterior extremity of the body.

The extremities above, of the same color as the back; beneath, the color of the abdomen. A few small dark colored blotches upon the anterior extremities; larger spots, sometimes transverse, upon the posterior. Fingers four in number, short, free. Toes five in number, semipalmated; the second, much the longest; a large tubercle beneath, resembles somewhat a sixth toe.

Salamandra. Brogniart.

Generic characters. *Body elongated; tail long; extremities four; fingers four; toes five; no tympanum; numerous small teeth in the jaws and palate; tongue as in frogs; no sternum; ribs rudimental; pelvis suspended by ligaments.*

S. *erythronota.* Green. *The red-backed Salamander.*

Journal Acad. Nat. Sciences, vol. i. p. 356.
Harlan's Med. and Phys. Res. p. 95.
N. A. Herpet. vol. iii. p. 113, et fig.

This beautiful and quite common species presents the following characters. My description is drawn

up from a specimen between three and four inches in length. Tail rather shorter than the body, cylindrical, gradually tapering to a sharp point. On the upper part of the body, a broad band of a reddish brown color, sprinkled with brown spots, extending from the snout to the extremity of the tail, being less marked however upon the latter. Beneath, cinereous; much darker upon the sides. Throat whitish, having a distinct fold. Upper part of the head and tail, and also the sides of the body, presenting, under the microscope, a beautiful metallic lustre. Head wider than the body, three lines in length, one line and a half in width. Eyes very prominent; pupils black; irides metallic-colored. Anterior feet with four toes; posterior, five toed.

This species is very agile; walking rapidly when undisturbed, and running by sudden and irregular jerks when taken. I kept specimens alive several weeks by allowing them dead leaves, which were constantly kept moistened. From correspondents, I have received them from Cambridge, Roxbury, Milton and Amherst, at which places they were found under stones and decayed wood.

S. *symmetrica*. Harlan. *The symmetrical Salamander.*

Journal Acad. Nat. Sciences, vol. v. p. 158.
N. A. Herpetol. vol. ii. p. 59, et fig.

The fine specimens before me of this species were found at Amherst, under decaying wood and leaves, by Professor Adams.

Length, three inches; tail, the length of the body, circular at the base, compressed towards the extremity. Whole upper part of the body, of a salmon brown color; on each side of the spine, from three to seven small ocellated spots of a beautiful vermillion color, surrounded by a black areola; skin above, covered with innumerable very minute tubercles, scarcely discernible without a glass, giving it a rough appearance. Beneath, of a golden orange color, sprinkled with minute black points, from the tip of the chin to the very extremity of the tail. Head three lines long, two wide, flattened; two longitudinal very obvious ridges, the length of the head, between the eyes. Eyes, not very prominent, of a deep black color, with a bright golden iris. Snout, obtuse. Anterior feet, with four toes; posterior, five toed.

In young specimens, the whole back is covered with minute black dots, and the sides have fewer ocellated spots than in the adult. The largest specimen in my possession, has seven ocellated spots on each side; in different specimens, these spots vary in number; but in all the specimens I have seen, an equal number exists on each side of the spine, in the same specimen.

The motions of this species are much less rapid than those of the "*erythronota.*" It casts its skin in June. In the stomach of this species are found *spiders*, and detached portions of *insects*.

Dr. Holbrook has received this species from Florida; and J. W. Randall, M. D. of this city, brought me specimens from Hallowell, Maine.

S. *fasciata*. Green. *The banded Salamander.*

Journal Academy Nat. Sciences, vol. i. p. 350.
Harlan's Med. and Phys. Res. p. 94.
N. A. Herpet. vol. iii. p. 103, et fig.

The beautiful living specimen, from which my description is made, was found by Professor Hitchcock, at Monson, and kindly transmitted to me.

Its length is five inches; length of the tail equal to that of the body; oval at its anterior portion, slightly compressed in its middle, and pointed at its posterior extremity. Upper part of the body, of a light clay or ash color, with transverse dark brown bands extending from the head to the extremity of the tail. Whole under portion of the body, of a dark slate color.

Width of the head, equal to one half its length. Eyes prominent; pupils, black; irides, color of the abdomen. Snout, rounded. Anterior feet, four toed; posterior, five toed.

Some of the bands in my specimen are confluent.

This is the only individual I have seen, and therefore think it must be a rare species with us.

S. *venenosa*. Barton. *The violet-colored Salamander.*

Daud. Hist. Nat. des Rept. t. viii. p. 229.
Trans. of Amer. Phil. Soc. vol. vi. et fig.
Harlan's Med. and Phys. Res. p. 93.
N. A. Herpetol. vol. iii. p. 105, et fig.

Dr. Barton's account of this, our earliest described Salamander, which is exceedingly interesting, is con-

tained in the "Transactions of the American Philosophical Society." His specimen was six inches and eight tenths of an inch in length. It grows to a larger size even than this.

The specimen upon my table, is five inches in length; tail, two and a half inches long, cylindrical at the base, compressed towards the extremity. All the upper part of the body, of a dark purple color. On each side of the dorsal line, a longitudinal row of oval, circular and oblong spots of a bright yellow color, varying in size; these spots commence on the back part of the head, and are continued towards the extremity of the tail, where they become single. Smaller spots of the same color on the legs and feet, and above one of the eyes. Beneath, the body is of a lighter color, with a great number of very minute white dots. Length of the head, two thirds of an inch; width across, half an inch. Eyes, of a deep black color, and very prominent. A strongly marked cuticular fold around the throat.

The above described specimen was found in Roxbury.

In another individual, found by Professor Adams, at New Bedford, three inches in length, a row of small yellow spots, resembling a broken line, partially encircles the eyes; in this specimen, the abdomen is destitute of the small white points so perceptible in the preceding specimen, but its sides are covered with them.

A specimen of this species was brought me from Kennebec county, Maine, by J. W. Randall, M. D.

S. *salmonea.* Nobis. *The salmon-colored Salamander.*

N. A. Herpetol. vol. iii. p. 101, et fig.

The specimen described by me in Holbrook's "American Herpetology," was found by Dr. Binney, in Vermont; but as Dr. Holbrook says an individual of this species has been "found in the neighborhood of Danvers, Massachusetts," I can have no hesitation in admitting it in this report.

Length, six and a half inches; length of the tail, two and a half inches; compressed, carinated above, gradually tapering to a point. Whole upper part of the body, head, tail and legs, of a yellowish brown color; the sides of the head, neck, body, tail and legs, of a salmon color. The entire surface of all the upper portion, as well as sides, spotted with irregular grayish markings, which are more obvious on the lighter colored sides. Beneath, the head and body white; light salmon color beneath the tail.

Head, one inch in length; width of the head, back of the eyes, four lines; snout, very obtuse; nostrils, rather small; a strongly marked cuticular fold upon the neck. Eyes, remote, and very prominent; pupils, deep black, with a metallic, copper-colored iris; from the edge of the upper lip, just exterior to the nostrils, arises a salmon-colored line about a fourth of a line in width, which runs back to the inner angle of the eye, and passing up over the eye loses itself upon the middle of the back part.

This species was found upon moist land. It lived

a year in confinement, and appeared perfectly healthy, eating voraciously of flies.

S. *dorsalis.* Harlan. *The many spotted Salamander.*

Journal Academy Nat. Sciences, vol. vi. p. 101.
Harl. Med. and Phys. Res. p. 99.
N. A. Herpet. vol. ii. p. 57, et fig.

From Roxbury and Amherst I have received numerous specimens of this species by the aid of Professor Adams, and my brother-in-law Dr. Brewer. An individual three inches and three lines in length, exhibits the following characters. Tail rather longer than the body. Body, above, dark olive, and granulated as in the "*symmetrica;*" lighter on the sides. All the upper part of the body, together with the feet, to the extremities of the toes and tail, sprinkled with innumerable black points. Beneath the body, the legs, and tail, of a sulphur color, darker under the tail, and tinged with olive; similar black points with those above, are spread over the surface beneath, which in some specimens are much larger than in the "*symmetrica.*" Eyes prominent; pupils and irides similar to those of the "*symmetrica.*" Tail very much compressed in its whole length, carinated above and beneath. Vent very prominent. Anterior feet with four toes; posterior five toed. Ocellated spots of a similar color with those on the "*symmetrica,*" but smaller, are arranged on each side of the spine;

these spots vary in number on the two sides; thus, of the eight living specimens before me, of nearly the same size, but three have five of these spots on each side; the others have three and four and six and seven on one side, with five on the other; and one specimen has nine on one side, eleven on the other, with a single line with one similar spot beneath this line on the side, and still another beneath, on the edge of the yellow abdomen.

All the specimens I have seen were taken in brooks. In the stomachs of several individuals, were found fragments of the genera "*Lymnea*," and "*Physa*." I have kept these animals for months, they seeming to thrive very well by a daily supply of fresh water, and a sufficient quantity of flies which they seize by a sudden spring, and swallow by several continued efforts. This species casts its exuviæ in June, and the new cuticle is in all respects similar to the former.

In the "*Journal of the Academy of Natural Sciences*," Harlan describes a salamander which he calls "*dorsalis*," some of the specific characters of which, are "a *whitish dorsal line* extending from the occiput over the tail; a row of *whitish colored* oblong spots on each side of the dorsal line; *beneath*, freckled with black dots."

Not meeting with any description which agreed with the species I have just described, two years since I read an account of it before this society under the name of "S. *millepunctata*." My friend, Dr. Holbrook, while examining, with me, the last season, the reptiles belonging to

the Society, assured me he had seen the specimen in Philadelphia, originally described by Harlan, and that it was the same species that I had supposed new. How Harlan could have made such a description as he has from this species, it is difficult to imagine. He must have described a specimen preserved in spirits, else he could not have seen "a row of whitish colored oblong spots on each side of the dorsal line;" but even alcohol could not produce "a whitish dorsal line," where no defined line existed, of any color, in life. Dr. Holbrook's second volume of his "*North American Herpetology*," containing a description of the "S. *dorsalis*," has, within a few months, issued from the press. Were I governed by his description, which makes no mention of the innumerable black dots above, which cover its entire *upper* as well as *under* surface in every individual of whatever age I have met with; or his plate, which corresponds with it, I might be induced to disbelieve the identity of our species; but preferring to think the omission may have been accidental, I would yield my doubts to the conviction of that distinguished herpetologist.

S. *picta.* Harlan. *The painted Salamander.*

Journal Academy Nat. Sciences, vol. v. p. 136.
Harlan's Med. and Phys. Res. p. 98.

I have never met with this species; but Dr. Pickering, of Philadelphia, informed me, some time since,

that a specimen belonged to the cabinet of the "*Academy of Natural Sciences*," which was found in a well at Ipswich in this State; I therefore extract from the Journal of the Academy, Harlan's description of the species:

"Body blackish or dark slate color above, yellowish or light orange color beneath; skin beneath the neck, folded; head large; legs strong; tail compressed at its inferior portion nearly the length of the body.

Dimensions. Total length nearly four inches; body rather more than two inches; tail less than two inches; length of the head six tenths; breadth five tenths; length of the hind legs six tenths; of the fore legs four tenths.

Description. Head large, rather flat; occiput broad, slightly protuberant; snout obtuse, rounded anteriorly; rictus of the mouth wide, extending posteriorly to the eyes; anterior borders of the lips slightly undulating; skin of the throat folded, so as to form a collar nearly surrounding the neck; body above, blackish; a longitudinal furrow extending from the occiput along the back to the base of the tail; inferior portion of the body obsoletely punctured with dark spots, more visible on the sides; legs short, strong, and thick, externally of the color of the back; internally of the color of the belly; tail subquadrangular for the first two thirds; the remainder or inferior portion abruptly compressed, pointed, with the superior and inferior borders carinate."

S. *glutinosa.* Green. *The blue spotted Salamander.*

Journal Academy Nat. Sciences, vol. i. p. 357.
Harlan's Med. and Phys. Res. p. 94.

The only specimen I have seen, was sent me from Andover by Mr. Alonzo Gray. It continued alive for several weeks, and presented the following characters:

Length, six inches. Whole upper part of the body, of a very dark brown thickly sprinkled with distinct light blue spots. Sides appearing quite light colored, from the blue spots having become confluent. Abdomen lighter colored than the back, exhibiting the spots more numerous and distinct than the back. Head, three quarters of an inch long; nearly half an inch wide, flattened above. Eyes very prominent; of a deep black color, widely separated from each other. Nostrils rather small. Legs, color of the body, and spotted like it. Anterior feet, four toed; posterior, five toed, and unusually long. Tail, length of the body; much compressed throughout its whole extent, save the extremities, the anterior of which is circular, the posterior pointed.

S. *maculata.* Green. *The brown spotted Salamander.*

Journal Academy Nat. Sciences, vol. i. p. 350.
Harlan's Med. and Phys. Res. p. 96.

The only specimen of this species I have seen was brought me by John W. Randall, M. D., of this city, who found it in a pond in Groton. This is quite a young specimen, being only an inch and a half long, and having the branchiæ still attached; and as its colors have somewhat changed in the alcohol, I extract Green's description from the *Journal of the Philadelphia Academy*. "Length, four or five inches; tail about as long as the body, tapering, slightly compressed, and pointed; snout rounded; back whitish, sprinkled with irregular, reddish brown spots; beneath white; anterior feet, four toed, posterior feet five toed.

NOTE. Individuals of this species vary much in size, and in the number of spots. I have one about three inches long, with the tail more compressed and obtuse, than the above."

All the Salamanders here described, feed upon insects, which they devour in very large numbers, and hence their utility cannot be questioned.

ART. II.—A REPORT ON THE BIRDS OF MASSACHUSETTS MADE TO THE LEGISLATURE IN THE SESSION OF 1838-9. By REV. W. B. O. PEABODY, Springfield, Mass.

INTRODUCTION.

THE history and habits of our birds are not yet fully understood, and notwithstanding all which has been done, many experiments and observations would be necessary to ascertain them more satisfactorily, and accomplish all the objects of a survey. It will, moreover, be obvious, that, were I so situated as to be able to make them, it could not be done without employing in it several successive years. I therefore communicate such information as I have, trusting that our present knowledge will soon be extended by the active and intelligent observers, who are engaged in this delightful study.

One object proposed is, to enumerate the birds of Massachusetts; another, to give what information we possess respecting their habits, particularly such as cultivators are interested to know. As Nuttall's valuable Manual is accessible to most readers, I have thought it better to refer to him for descriptions of the appearance of our birds, than to swell this report by repeating them. For the same reason, I shall follow his arrangement, subjoining to my account of each bird all I can learn respecting its services and depredations; that the husbandman and horticulturist may determine which it is his interest to protect, and which he has a right to destroy; or rather, whether it is not the part of wisdom to encourage and protect them all.

With respect to the first of these objects, it would be easy to give the names of those which remain with us

throughout the year, or of those which come to us in their regular annual migrations. But beside these, there are some which make their appearance at uncertain intervals, and it is not always easy to determine whether they should or should not be numbered with our birds. There are others also, which have been found apparently wandering from their usual ways, but which, having come to us once or twice, may do so again. The proper course seemed to be, to give the names of all which have ever been seen here, leaving it to future observation to determine whether our State is their resting-place or their home.

In explanation of the difficulty alluded to, I may mention one or two facts which were communicated to me by Dr. Thomas M. Brewer of Boston, whose unwearied and successful researches will soon extend our knowledge of this subject much beyond its present bounds; and to whom, in connection with some other gentlemen, whose names will appear in the course of the report, I am happy to acknowledge my great obligations. He informs me, for example, that a Purple Gallinule, *Gallinula martinica*, was shot in Stoneham on the 27th of November, 1837. This is a bird belonging to tropical America, and usually passes its winters near the Gulf of Mexico; and yet, when taken, instead of appearing exhausted, like a lost wanderer from its usual haunts, it was in good flesh, and evidently had been lately feeding. Mr. Cabot also states that a Florida Gallinule, G. *galeata*, was shot in Fresh Pond several years ago. This last incident is not wholly unprecedented, the same bird having been found near Albany, in the state of New York. The visit of the beautiful Purple Gallinule, is, I believe, entirely without example. But I can no more regard them as our birds, because they have been thus found once or twice within our borders, than I can regard the Stormy Petrel as a land bird, from the circumstance of having met with it in Springfield, seventy miles

from the sea. I learn also from Dr. Brewer, that three specimens of the LITTLE CORPORAL, *Falco temerarius*, were lately killed in Stoneham and brought to the Boston market. This is a bird discovered by Audubon, and so rare, that even Nuttall professed to know nothing of it from personal observation. The same gentleman has also obtained in Boston harbor, the POMARINE JAGER, *Larus pomarinus*, a bird so rare, that the indefatigable Audubon himself never encountered it within the limits of the United States.

It is well known that some birds, for obvious or unknown reasons, change their favorite resorts, at times withdrawing from places where they have been common, and appearing in other places where they have not been seen before. Of this singular migration, the CLIFF SWALLOW, *Hirundo fulva*, is a remarkable example. It is well known that the Chimney swallow came from the wilderness in the same manner; but in that case, the reason was manifest; it was because, in cities and villages, chimnies are always to be had, while trees, hollow from the top, are not common, even in our ancient woods. No similar reason can be given for the movement of the Cliff Swallow, which has emigrated to us with a quarter of a century, and is now the most common of the tribe in some parts of the State. The earliest information I have of its appearance in New England is from Chief Justice Shaw, who tells me that he found it at the White Mountains, in the summer of 1816. In the case of birds rarely or lately found among us, I can only offer what information I am able to obtain, and must leave it to the reader to judge for himself, whether they come as accidental wanderers, as spies to explore the country, or as pioneers to take possession and establish a permanent home.

With respect to the second object of the survey, that of giving information which may be useful to cultivators of the soil, I am fully persuaded from my examination of the

subject, that there are no birds which it is our interest to destroy. There are some which are occasionally troublesome in our fields and gardens; but, do what we will, we cannot prevent their depredations; if we shoot them, we only gratify our revengeful feeling, since new reinforcements stand ready to supply the place of every one that falls. And this is not the only thing to be regarded. In every instance of our removing a present inconvenience, we are opening a door for the entrance of much greater evils. But without any systematic discussion of this point, I shall introduce remarks as they suggest themselves, in the course of the report, showing where we are indebted to any birds for services, and where we suffer from their depredations; leaving the reader to balance the one against the other, and to judge for himself whether the course of mercy or revenge is the best for him to pursue.

Having made these remarks in explanation of the plan which I propose to follow, I proceed to give the names of such residents and visiters in our State as I have been able to ascertain. There may be some passed over; and if so, I hope that those who have not favored me with the results of their observations, will aid in accomplishing the objects of the survey, by giving the information they may possess, to the public, in some other form.

BIRDS OF PREY.

The Jer-falcon, *Falco Islandicus*, a bold and graceful bird, is seldom found wandering far from the icy latitudes in which it dwells, and it is in only the depth of winter, that it is ever seen as far south

as Massachusetts; but we have Nuttall's high authority for saying that a pair is occasionally seen within our borders. In the days of falconry, this fine bird was employed for striking the larger prey, which it did by out-soaring and pouncing upon them with great rapidity and power. There is much variety in its markings, and some specimens are found to be nearly white; which is believed to be an indication of age, its whiteness increasing with years.

The American Sparrowhawk, *Falco sparverius,* a beautiful little falcon, which is said to be rare in the maritime parts of our State, is not at all uncommon in the inland villages, where it comes fearlessly into cultivated enclosures, and pursues its prey without regard to those who pass by. The blue jays have a bitter aversion to it, probably, because it interferes with their own piratical expeditions. Whenever it appears, they follow it with loud and abusive language, mocking its cry with ridiculous exactness, till the hawk, who, in general, seems rather entertained with the exhibition, at last, stunned with their noise, and provoked at their impudence, seizes the foremost of their number; without, however, putting a stop to their persecutions.

This bird is partial to the southern climates: some few remain in New York during the winter, but the ordinary cold of New England at that season is too severe. Still, it is seen here in cold weather, perched on some tree or stake which commands an open view, where it watches for mice or any smaller

game, not being particular, and caring more for the quantity than the quality of its food. It is easily tamed, and would be an amusing companion, were it not for its taste for chickens; the hen, no longer hen-hearted in defence of her young, gives battle to the little hawk and destroys him. I believe that the nest of this bird has not been found in our State.

The Pigeon Hawk, *Falco columbarius*, is rare in the western part of the state, and Nuttall had the impression that it was not seen in New England; but Dr. Brewer informs me that he has often found it in the vicinity of Boston. It is migratory in its habits, and, when in pursuit of its prey, cares not whither it goes. It siezes the robin, the wild pigeon, and even the gold-winged woodpecker, on the land; and on the water, it pursues much larger birds, which can escape from it only by diving. It has been known to attack birds in cages, in the very heart of cities; and so indifferent is it to danger, that it does not even shun the presence of man, the common object of dread. When wounded, it throws itself on its back as the hunter approaches, and with angry screams, prepares to defend itself to the last. Where the pigeon hawk raises its young is not certainly known. It is not seen in the United States, except in early autumn and winter; in the spring and summer, it is probably in the northern regions; but at other seasons it travels to the most southern boundaries of our country.

The Little Corporal, *Falco temerarius*, is so rare a bird that when Nuttall's work was published, the only specimen known, was the one discovered in Pennsylvania, and described by Audubon, twenty years before. In a spirit of somewhat doubtful compliment, he named it after Napoleon, I believe from some supposed personal resemblance to that great human bird of prey. Nothing is yet known respecting its habits, nor the place and the manner in which it rears its young; but the singular fact just mentioned, that three specimens of a bird so uncommon were obtained at the same time in a single village, seems to indicate that the species will be more common. This would be no unheard of thing on the part of hawks, which sometimes appear and remain in considerable numbers, where none had been found for years, if ever before.

The Golden Eagle, *Falco fulvus*, a fierce and angry bird, loves the wildness of desert and mountainous regions, where it neither seeks nor fears the presence of man. As such tracts are not wanting in Massachusetts, it sometimes comes within our bounds; but it delights more in ridges as desolate as the White Mountains of New Hampshire. It is not common anywhere, and is hardly ever seen in the more level and cultivated parts of the country. In pace and swiftness of flight it is inferior to some other birds, but it exceeds them all in the power of its brilliant eye, which enables it to aim, with unerring precision, at its destined prey. Its flight, if not so rapid as that

of other eagles, is exceedingly majestic and graceful, and answers to the fine description,

> "Sailing with supreme dominion,
> Through the azure depths of air."

The nest of the golden eagle has been found on the Hudson, but never, I believe, within the limits of our state. Perhaps it may be found hereafter on Graylock or some of our western mountains. They build, of course, where they can find abundance of their usual food, such as fawns, young racoons, rabbits, and wild turkeys; but they are indifferent to climate, enduring the utmost severity of winter, and moving with ease and unconcern in the face of the most violent storms. The golden eagle would be the acknowledged head of its family, were it not for the giant discovered by Audubon. The ring tailed eagle of Wilson is now well known to be the young of the present species.

The WASHINGTON EAGLE, *Falco Washingtonianus*, was discovered by Audubon, and happily named by him in honor of the man, who is still the absolute sovereign of all hearts in this country, and will continue to rule over it, for ages, by his memory and example. It was known before our great ornithologist recognised it as a new species, and was supposed to be one of the familiar kinds; but from the circumstance of its building on a cliff, and procuring its food by diving instead of robbing the fish-hawk, it was obviously different from the brown eagle, as the bald eagle, in his immature state, is often called. It was not till two years after he first saw it, that

Audubon was able to obtain a specimen, when he found that his conjectures were correct, and that it was neither the brown or sea eagle, as Wilson calls the young of the white-headed, not knowing that it was an immature bird ; nor was it the true sea eagle, *Falco albicilla*, which it more resembles. From the latter it is distinguished by its greater size, and by the greater length of the tail, which in *F. albicilla* does not extend beyond the folded wings.

The favorite residence of this bird is in the rocky solitudes near the great lakes, where it is seen flying in broad circles near the land or the surface of the water: when about to dive, it descends in spiral rounds, keeping its eye upon the fish, and comes very near it before it makes its plunge; when rising, it flies low, to a considerable distance, and then devours its victim at leisure. When the severity of winter closes the water and abridges its means of subsistence, it sometimes wanders into New England, and in January and February, the coldest months in our year, it is occasionally seen within our bounds.

The Whiteheaded or Bald Eagle, *Falco leucocephalus*, is the most familiarly known of all the eagles. Against the remonstrances of Franklin, it was adopted as the emblem of our country, an honor to which it was entitled, if not by its character, at least by residence, since it is found in every part of the Union, leaving the colder latitudes to the sterner and hardier of the race. It manifests a preference for the warmer parts of the country, but all who live

near our lakes and larger rivers or the shores of the sea, are acquainted with its towering flight and its solemn cry, which, impressive as it is, in the midst of desolation, is nevertheless, like that of all other eagles, so harsh and discordant as to leave without excuse the excise officers of Bristol, in England, who detained a couple which Colonel Montague had imported, under the act which imposed a duty on singing birds.

The manner in which this eagle subsists, though not creditable to its morals, is strongly illustrative of its power; and as power and oppression are apt to be united in human beings, we cannot wonder that the same alliance should exist in birds. It stands perched on some tree, from which it commands a wide view over the waters, where it waits in gigantic repose, its wings lifted, as if keeping time with the heaving sea. It seems to look with calm unconcern on the numberless birds that are sporting or gathering food upon the waves; but all the while its bright eye is fixed upon the industrious fish-hawk, which, unconscious of danger, is quietly gathering food for his young. The moment he reappears from his plunges, whitening the sea with foam, the eagle launches forth from his resting place, pursues him with force and rapidity even greater than his own; and when, after wheeling in broad circles and trying every art and effort to escape, the hawk is compelled, as a last resource, to let fall his prey, the eagle balances a moment, as if to make sure its aim, then shoots down like an arrow, and secures its prey before it touches the wave. These exhibitions excite

much sympathy for the injured party in those who witness them ; and it is to be hoped, that it was no prophetic discernment which selected this eagle, beautiful as it is, to represent the character of our Union.

Sometimes the fish-hawks, when they can endure their injuries no longer, combine their forces, and compel the eagle to retreat from the shore. In that case, it makes havoc among other birds, or when those resources fail, it sometimes carries away lambs from the neighboring farms. It is said that it has made an attempt to carry off children, and there is no doubt that it has sufficient strength and courage. Sometimes it robs the sportsman of the birds which he has shot ; it seems to understand the use of the gun, and to know that, when once discharged, it is harmless till loaded again. It is commonly very difficult for a person thus armed to approach this eagle, for, audacious as it is, it does not rashly expose itself to danger. It is shot by approaching it under the cover of a tree, or after a snow-storm, when, for a time, it seems to lose much of the power of its eye.

The white plumage of the head, from which this eagle derives its name, is not fully developed till the fourth, and sometimes not till the fifth or sixth year of its age. This is the case when the bird is in confinement ; perhaps when at liberty, it may attain its full beauty at an earlier age. In other respects, this eagle is mature within a year from the time of its birth.

The FISH-HAWK, *Falco haliætus*, which is so

often a victim to the rapacity of the eagle just described, is an interesting and harmless bird, which confines itself industriously to its employment of fishing, never attacking other birds nor land animals, though it has great strength of flight and of talons, and though it sometimes arrives in the spring, when the bays and ponds are frozen and its food is difficult to be procured. It has no controversy with any bird except the eagle, and that warfare must be regarded as defensive; no single hawk is able to encounter the enemy, but, by joining their forces, they become too strong to be resisted.

The fish-hawk is on excellent terms with the fishermen, though they are of the same trade. Its coming announces the arrival of the shoals of fish that crowd our rivers in the spring. Perhaps its exemption from persecution may be owing also to its well known gentleness of disposition. Unlike other birds of prey, the fish-hawks are social and friendly to each other. They come to us in flocks of eight or ten, who build near each other, and rear their young in perfect harmony, and this spirit of hospitality and kindness is extended to other birds that seem to have no claim upon them. The crow blackbirds are permitted to shelter in the interstices of their nests, which are huge constructions, made of a cartload of heavy materials firmly matted together. The notion that the fish-hawk protects the domestic poultry from other hawks is without foundation, since it never interferes with the pursuits of any bird whatever. It is well, however, that the impression should exist, for if not well

founded, it serves the cause of humanity and saves the fish-hawk from destruction.

These birds come upon the coast of Massachusetts at the last of March or the beginning of April, keeping time with the alewives, on which they feed. For some reason or other, they seldom breed here. The first appearance of frost, is the signal for them to retreat to warmer climates. They are not uncommon in the interior of the country near our lakes and large rivers. In winter, they are sometimes seen near New Orleans; but this is not by any means the extent of their migrations, and these probably are individuals which have not strength to accompany the rest.

The American Goshawk, *Falco palumbarius*, formerly supposed, on the authority of Bonaparte, to be different from the European, is now generally admitted to be the same. It is not common in Massachusetts, nor in any part of the United States; but it sometimes follows the flocks of ducks in their migration, and destroys considerable numbers. It is an active and restless bird, seldom seen off the wing, except when devouring its prey, and is so fleet in its motions that, in Maine, it will dash down at the farmer's door and carry off chickens so rapidly that it is hardly possible to shoot the robber. In the western country, it follows the immense flocks of pigeons, and selects its prey from among them, notwithstanding the swiftness of their flight. Audubon saw one of them give chase to a flock of grakles, from which he seized four or five in succession,

letting them drop into the water below; after killing a sufficient number, he picked them up one after another and carried them to the shore. This bird is so savage and voracious, that it has been known to eat the young of its own species, when destitute of other food.

The American Brown, or Slate colored Hawk, *Falco fuscus*, is now known to be the same with *F. velox*, and *F. Pennsylvanicus*, which Wilson described as distinct species, though not without suspicions that they might turn out to be the same with others formerly known. It is not common in New England, but is said to abound in the thinly settled parts of the southern states, where it often makes great havoc among the domestic poultry, which it seizes and carries off in the very sight of the farmer. We learn from Nuttall, that one of them, in pursuit of his prey, burst through the glass of the green-house in the Botanic garden at Cambridge, and then through an inner partition of glass, where, his wing feathers being torn by the glass, he was arrested in the attempt to break through a third. Wilson speaks of the slate-colored hawk as found in the Atlantic states generally; but its numbers anywhere must be small. Its nest was found by Audubon, in one instance, in a hole in a rock, in others, built with sticks on trees.

Cooper's Hawk, *Falco Cooperii*, was named by Bonaparte, in honor of Mr. William Cooper of New York. It is added to the list of our birds, on the

authority of Mr. Samuel Cabot, Jr., who obtained a single specimen in Cambridge. The circumstance that so little is known of this fine bird, after all the researches of eminent ornithologists, shows what a broad field of the science is yet untrodden, and makes it a subject of congratulation, that so much zeal and intelligence are now engaged in the study. The food of this hawk consists principally of birds; which, of various sizes, from the ruffed grous to the sparrow, are laid under contribution. In the southern states, they are said, like the preceding species, to be troublesome in consequence of their depredations upon the poultry.

The Rough-legged Falcon, *Falco lagopus*, and *Falco Sancti Johannis*, were supposed to be two distinct species, till Audubon showed that these, and *Falco niger* of Wilson, were names of the same bird at different ages; a mistake easily made, since of eight specimens which Audubon received at one time in Boston, no two were alike in their markings. Their flight was alike, and all their attitudes, as they sat perched on stakes and trees, or flew about pursuing their prey; but the dark colored birds were much more shy than the light ones, a difference which he ascribed to their greater age. *Falco niger*, in his opinion, is the old rough-legged falcon.

These birds are found in the neighborhood of swamps and marshes, where they watch for moles, mice and frogs, and occasionally encounter a wounded bird. Their appearance is heavy and inanimate, suiting well with the dreary places where they

reside; but as they are supposed to resemble the owls in their vision, perhaps they make up, by activity at night, for their sluggish listlessness by day. Their home is in the north, where they doubtless rear their young; but their habits in this respect are very little known; it is only in winter, when their food fails, that they come into our State, and sometimes procced to the south as far as Maryland.

The SHORT-WINGED BUZZARD, *Falco buteoides*, is found in this State; more abundantly at the approach of winter than at any other season. In New York, it is said to commit depredations on the poultry; but here, it is not thought to have activity and courage enough for an enterprising and successful robber. It remains inactive on the margins of swamps and meadows; making a hoarse cry at intervals, to which its mate replies. But if not remarkable for spirit, it has some good traits of character; it is said that, if the female is killed, the male will attend and feed the young till they are able to provide for themselves; but of their habits in this respect, we know nothing from observation; they do not breed in this State, though Pennant says that they remain in New York through the year, and build in the beginning of May.

The RED-TAILED HAWK, *Falco borealis*, is more certainly known as a destroyer of poultry. Though shy at other seasons, in winter they approach the farm, sweeping near the ground and snatching a wandering hen or chicken. But, like the crow,

they seem to have an intuitive perception of the use and reach of the gun, and if they see a person armed, they give a scream of disgust, and sail away far beyond his reach. As farmers give them the name of hen-hawks, and treat them accordingly, they are compelled to exert much caution in their distant intercourse with man. They are able to do this successfully, by means of their rapid and powerful flight; they can float high over a whole plantation, without a single flapping of their wings; all the while they make a mournful cry, as if wholly intent upon their own sorrows, but they are in reality keeping sharp watch on every thing that moves below; should they see an animal, they alight, take deliberate aim, and shoot down like an arrow to secure it. They will sometimes, as if in the mere enjoyment of this power, soar upwards till they are lost in the clear blue sky. These birds rear their young in Massachusetts, building in forests where they may escape persecution. The frame-work of their nest is made of sticks, and finished with twigs and coarse grass. The eggs are of a dull white, blotched with black and brown. The young are fed with squirrels, rabbits, and various other food. As soon as the young are able to take care of themselves, the old birds dissolve their partnership, and treat each other as perfect strangers.

The Black Warrior, *Falco Harlanii*, was first discovered by Audubon in Louisiana. He at first supposed it to be the black hawk of Wilson, but on examination it proved to be a new species, al-

lied to the preceding, but superior to it in every thing but size. It is considerably smaller, and, though not able to contend with its enemy, the red-tail, escapes by its superior fleetness. It seldom preys on animals, but subsists on poultry, partridges and other birds. Nuttall informs us that these birds are occasionally seen in Massachusetts; and, though it is not known that any one has been taken, the observation of such a naturalist is not to be disregarded. Of the nest and habits of this bird, at the breeding season, nothing is yet known.

The Red-shouldered Hawk, *Falco lineatus.* It has been a subject of discussion whether this is a species distinct from the Winter falcon, *Falco hiemalis;* Audubon, in his first volume, maintained that they were different, and said that the winter falcon was much more common than the former. I have since understood that he has found reason to change his opinion; and if it be true that they are the same, *F. lineatus*, the name of the supposed adult, is the one that should be preferred. In a list kindly furnished me by Dr. Brewer, it is set down as breeding in our State.

The Hen-harrier or Marsh Hawk, *Falco cyaneus*, though found here in considerable numbers, is not of any great importance, either as a friend or an enemy of man. In the southern states, though not common, it is in high estimation for its services in destroying the small birds, while they are engaged in plundering the fields; but in the northern states, it generally confines itself to marshes, where it

skims along the ground in search of mice and frogs, which are its main dependence for food, sometimes carrying on its labors in the twilight or the moonlight. In the winter, it extends its migration from Hudson's Bay to the southern limits of the United States. Audubon found it at Labrador, on the one hand, and at Texas on the other.

The Merlin, *Falco æsalon*, of which a specimen was obtained by Dr. Richardson at Carlton House, in the fur countries, is at present but little known in America. It is the same with the English merlin, which was formerly used in falconry, being valued for its strength and spirit, though inferior in size. The female could kill a partridge at a single pounce, but the male contents himself with humbler game. Nuttall assures us that this bird is occasionally seen in the vicinity of Boston.

In the list of birds of prey, I have not included the Great-footed Hawk, *Falco peregrinus*, not having ascertained that any one has been taken here; but as they are growing numerous in other places, where they have been rare, and are now found in states not distant, subsequent observations will probably include them in the number of our birds.

The Hawk Owl, *Strix funerea*, is so much like the former class of birds of prey, in its appearance, that, at a short distance, one could hardly determine whether it is a hawk or an owl. It is a native of the Arctic regions; in the fur countries it is well

known, from its practice of following the hunter and snatching up the game when it falls. Little is known about it here, since it is but seldom that it wanders into New England.

The Snowy Owl, *Strix nyctea*, is more common in Massachusetts than in most other states of the Union. It makes its appearance at the approach of winter; its large size and snowy plumage are well suited to resist the climate, in the icy solitudes where it dwells, and nothing but the difficulty of procuring a subsistence, drives it from its favorite home. There, it delights in the stern solitude of a night which lasts for half the year, and its dismal cries, resembling those of a man screaming in agony, are said to increase the dreariness even of that fearfully desolate scene. When it is compelled to wander in search of food, it is quite abundant in Canada; often found in the most northern states, and occasionally seen as far south as Florida. It frequents the banks of streams, sailing slowly over the surface, or takes its station on a rock, watching for its prey; and the moment a fish appears, it secures it by a sudden grasp of its claw. Its food, however, is various, consisting of rabbits, grouse, ducks, and mice; it is probably the pursuit of rats and mice which brings it near the abodes of men, where it would not be caught by accident, since it has power to see both by night and by day.

Audubon believes that he has reason for asserting that the yellowish whiteness which makes the plumage of this owl so rich and beautiful, is not ac-

quired till after a certain age. He has shot many which were of an uniform light brown; these he formerly thought were of a different species; but now he considers them the young of the snowy owl.

This bird is said to breed in the northern parts of the state of Maine, but there is, as yet, no sure authority for the assertion. Their nests are not found in Labrador nor Newfoundland; probably they are to be sought for in the highest latitudes, since the snowy owl comes to us like a herald of the winter storms, and spends the rest of the year in his Arctic home.

The Red Owl, *Strix asio*, is a permanent resident, and rears its young in Massachusetts; appearing more common in winter, not because it migrated in the milder season, but, its supplies in the forest failing, it comes to barns and houses in search of food. During the day, it finds shelter in unfrequented places, and when seen, appears drowsy and listless, as if more than half asleep. It has good reason for preferring solitude at such times; for the smaller birds, which it persecutes by night, know that they have the advantage by day, and do not scruple to follow up their revenge. Sometimes they proceed from words to blows, and the owl, having the worst of the battle, is compelled to seek safety in a random flight. It is known by the name of the little screech owl, from the cry which it makes in the early part of the night.

In connexion with the history of this bird, Audubon asks the question, why it is that the owls

living in the milder climates, should be thus defective in their power of vision, while the natives of Arctic regions can see both by night and day, when the sun or moon shines bright on the snow. Without referring to the structure of the eye, it is obviously a *reason* of this difference, that, if those birds had not the double power, in latitudes where the days and nights are unequal, they would be able to see for half the year, and would be blind for the other; and thus, when the days are long, must perish for want of food; whereas, to those which live where the hours of sunshine are not many, even at the summer solstice, it is no hardship to be compelled to take rest by day.

Nuttall kept one of these owls in confinement, to observe its habits. In the day, it retreated to a dark closet; but as night came on, it grew restless, gliding along the room in perfect silence, a power which the owls owe to the delicate plumage of their wings. Sometimes it would cling to the wainscot, and turn its head almost round, resembling a spectre with its bright glaring eyes. In all the owls, the globe of the eye is immoveably fixed in its socket, by an elastic cartilaginous case, in the form of a truncated cone. On removing the outward membrane which covers this case, it is found to consist of many parts, placed like the staves of a cask, overlapping a little at the narrow end, and capable apparently of being enlarged or contracted. The eye being thus fixed, the owl, in order to see any object, is obliged to turn its head, and has the power to move it round, almost in a perfect circle.

The red owl rears its young in Massachusetts; it lays from four to six eggs, in a hollow tree, with a lining of hay or leaves. As soon as the young are hatched, it makes liberal provision of food for them. It is the small birds which suffer on these occasions, and it is in revenge for this carnage, that they pursue the owl with so much detestation.

The Great horned or Cat Owl, *Strix Virginiana*, is well known, though not much to his advantage, in consequence of his depredations on the domestic poultry. Being one of the largest and strongest of his tribe, more than two feet in length and four in extent, with energy and courage in proportion, he is capable of making great destruction in solitary farm yards, especially when he adds to his powers of mischief, a caution and cunning, in which even the cat does not exceed him. This, however, is one of those evils which lessen as the population increases, so that in our state, though most villagers are acquainted with the bird, there is not much complaint made of his depredations.

The flight of this owl is easy and graceful: when it discerns its prey, it falls upon it so swiftly that escape is impossible. Hardly anything comes amiss to its voracious appetite, but it prefers the larger gallinaceous birds, and delights particularly in any fish that chance may throw upon the shore. Its cries are loud and shrill, sometimes resembling the barking of a dog; at other times, they are compared to the last gurglings of a murdered man striving in vain to call for help. When wounded, it resists with

great fierceness, striking with its bill and claws, its large eyes opening and shutting in quick succession, and its feathers rising so as to double its apparent size.

The great horned owl is one of those which rear their young in Massachusetts. The nest is generally in the fork of a tree, made of twigs, and lined with leaves and a few feathers. The eggs are from three to six in number; the color, white. The male relieves the female in sitting. The young remain in the nest till they are fully fledged, and acquire the full plumage of the old birds in the succeeding spring.

The CINEREOUS OWL, *Strix cinerea*, or Great Grey Owl, as he is commonly called, is very often found in Maine, but seldom in Massachusetts. Several years since, one was taken on a woodpile in Marblehead, and lived some months after its capture. But such visits are accidental, and its home is at Hudson's Bay and Labrador, where it is found throughout the year.

The LONG-EARED OWL, *Strix otus*, is found in Massachusetts, but is never common; it is most likely to be seen in winter, when it comes near the farms in search of rats and mice, which, together with moles and field-mice, are its chief dependence for food. It is sometimes mistaken for the young of the great-horned owl, a species which it resembles in everything but size, so that they are easily confounded by untaught observers. It is like it in

courage also, and, when wounded, makes a fierce and angry resistance, which it is difficult to overcome.

The Short-eared Owl, *Strix brachyotus*, is another of those wanderers which occasionally leave their northern home to visit us. It feeds almost entirely on mice, and can be brought into view sometimes, by imitating the low squeak of its prey. They are attracted also by the light of fires, and, either in blindness or ferocity, have been known to attack the men near them. They are remarkable for spirit, and, though small, not exceeding thirteen inches in length, it is almost dangerous to approach them. In their intercourse with each other, they are more social than most other birds of prey. Bewick says, that in England, more than two dozen have been seen engaged in the same field, destroying mice, in company. In this work of extermination they are eminently serviceable to the farmer ; but, like many other birds, they have reason to complain that man is slow to discover, and still slower to acknowledge his obligation.

The Barred Owl, *Strix nebulosa*, is found in this and all the other states of the Union, and though it inhabits the northern regions, abounds most in the southern parts of our country. Their food is various, consisting of rabbits, grouse, squirrels, rats and mice, and, beside what they obtain in the field and forest, they levy large contributions on the domestic poul-

try. They are not destitute of sight by day, but they move doubtfully, as if uncertain of the character of the objects near them ; in the night, they are quick and active, and if domesticated for the purpose, are said to make excellent mousers. So delicate is their plumage and so noiseless their motion, that we are told by Audubon, he was aware that one was flying directly over his head, only by its shadow cast by the moonlight on the ground ; though it was only a few yards distant and flying fast, he could not hear the least rustling of its wings. Their cry is loud and discordant, resembling a forced burst of laughter, and makes a strange contrast with the solitude and silence of the night.

The barred owl is often offered for sale in the New Orleans market, and by some is considered palatable food. Audubon says that the snowy owl is good eating, but they are so catlike in their habits, that, before they could meet with much favor, on the table, a considerable amount of prejudice must be overcome.

The Acadian or Little Owl, *Strix Acadica*, is found in Massachusetts, but lives so retired, by day, that it is not generally known. It is a beautiful and animated bird, with a note singularly discordant, resembling the filing of a saw. Audubon, one day, walking near his saw-mill, heard this sound proceeding from it, and finding the door locked, went to the miller's house, to ascertain who was engaged in filing the saw. There he ascertained that the little owl which had a nest hard by, was the author

of these unmusical sounds. This bird is probably the *saw-whetter*, which is heard so often by those who visit the White Mountains. Its common cry at night resembles the dull sound of a whistle.

This bird is solitary in its habits, confining itself to the evergreen forests by day. When disturbed, it flies timidly, and takes advantage of the first shelter it reaches, where it may be caught by one who uses sufficient caution in his approach. At evening it becomes lively, flying round with wonderful swiftness in search of mice, beetles, moths and grasshoppers. It sometimes manifests a desire to see the world. Some have been taken in the heart of our cities; in Cincinnati, one was caught on the edge of a cradle in which a child lay asleep.

The Arctic, or White-horned Owl, *Strix arctica*, is a rare and beautiful bird, of which a single specimen was obtained by Dr. Richardson, in his expedition, shot with an arrow, by an Indian boy. Nuttall says, that a specimen was once seen, for two or three days, in Cambridge, and from descriptions which I have received, of a bird resembling the snowy owl, with horns, I am persuaded that it will turn out to be a more frequent visiter than is now supposed.

Tengmalm's Owl, *Strix Tengmalmi*, is a small species, and so entirely a bird of night, that when seen abroad by day, it is unable to escape, and may be caught by the hand. It feeds on mice and beetles, and is found in all the forests of the fur countries, where its melancholy note, repeated at

intervals, like minute guns, awakens the superstitious feeling of some of the Indians, who call it the bird of death. It is on the high authority of Audubon, who, as Dr. Brewer tells me, has found this owl here, that it is added to the present list.

In an economical point of view, the birds of prey, just enumerated, are of no great importance. The hawks, and some of the owls, are powerful birds, and, as the depredations of the latter are carried on by night, they might be very destructive to the poultry, if their numbers were greater. But in so extensive a country, most of them can secure food without trusting themselves in the vicinity of man. For this reason, the great proportion of them do not come near us; and those which do, are more likely to render service by destroying field-mice and similar animals, than to make themselves odious by plundering the farm. Instead, therefore, of waging a war of extermination against them, it is our interest, if not to encourage, at least to let them alone.

OMNIVOROUS BIRDS.

Before proceeding to describe the omnivorous birds, which come next in the proposed order, it may not be amiss to make some remarks on the practice of destroying them, which prevails to a great extent in our state. Sometimes it is deliberately done, by those who wish to secure their orchards and gardens;

and, in such cases, there is a right, no doubt, to prevent aggressions, if possible. But far more are killed every year by wanton boys, who, without any reason but their own pleasure, are permitted to indulge in a cruel amusement, from which every man of sense and feeling should carefully withhold his children. Any one who can find sport in giving pain to animals, needs to be taught the first principles of humanity; and, lightly as this matter is regarded, it is certain that this thoughtless indulgence always depraves the moral feeling more or less, and leads on to the formation of habits of idleness which are not easily broken in after years. In a busy country like ours, there are few, beyond the age of boy-hood, who have time for play; a civilized man is supposed to find his enjoyments in his duties; and if he needs relaxation, he can find it without torturing animals, whose right to happiness is as good as his own.

It is, however, in the light of utility, that this subject can be most forcibly presented; and it will be seen, that, to exterminate birds which do a little harm occasionally, is to protect ourselves from a small evil at the expense of a greater; it is in fact securing the fruit by the sacrifice of the tree. There is no question that we are now suffering severely in consequence of this folly. No kind of cultivation is affected, to any considerable extent, by the depredations of birds, and if it should be, means may be devised to prevent them. Not so with the insects and their ravages; the fate of the locust, the apple, the pear, and many other trees, shows, that if insects fasten themselves upon one of them, we

must give it up as lost, for all that we at present know. Surely, then, of two evils we should submit to the one which may possibly be prevented, rather than invite and encourage one over which we have no control.

A slight calculation will show what an amount of service birds are able to render. Wilson makes the computation, that each red-winged blackbird devours on an average fifty grubs a day ; so that a single pair, in four months, will consume more than twelve thousand. Allowing that there are a million pairs of these birds in New England, in summer, which is but a moderate estimate, they would destroy twelve thousand millions. Let any one consider what an immense injury that number of insects would do, and this would be sufficiently striking to show how much we are indebted to the labors of these birds. But the computation may be greatly extended, for many insects have young by the hundred ; beside cutting off the existing destroyers, they are prevented from multiplying ; and when we consider what myriads of birds there are, constantly and efficiently engaged in this service, it gives us an impression, beyond the power of calculation to reach, of the astonishing manner in which the increase of insects is kept down, simply by sparing the lives of their natural destroyers ; and this, it must be remembered, is the *only* means of preventing their increase and reducing their formidable numbers. No other remedy that man can apply will reach the evil ; this is the vocation of birds ; and if, for the sake of removing a small evil, we

will not permit them to live and labor in it, we must not complain when the natural consequences come.

This is not mere speculation; we have experience to teach us on this subject. Kalm records, that after some states had paid three pence a dozen for the destruction of blackbirds, the consequence was a total loss, in the year 1749, of all the grass and grain, by means of insects which had flourished under the protection of that law. The example of our trees, just alluded to, is also a standing warning; for we see that new ones are adding to their numbers. The maple, perhaps the most valued of our ornamental trees, is now marked out for destruction, and in spite of all that *we* can do, will soon be entirely lost. There is nothing to prevent this process from going on; other trees will soon swell the list of victims; and when it is too late, we shall lament that we have extended the evil, by protecting our enemies and persecuting our friends. Every cultivator, for his own sake, as well as the public good, should endeavor to spread right views on this subject, and to show that the wanton extermination of birds, is throwing difficulties in the way of horticulture and farming, which no industry, science, or skill can overcome.

The American Starling, *Sturnus Ludovicianus*, better known by the name of meadow lark, is a beautiful bird, and one of the most welcome messengers of spring. Wilson thought it far superior to the sky lark in sweetness of voice, though not equal to

it in compass and power. By others, its song is underrated; and the truth is that the notes of different individuals vary from each other, some having a wiery and lisping voice, while that of others is eminently sweet.

The favorite haunts of this bird are meadows and old fields. They can walk easily on trees, but prefer the ground, where they employ themselves in searching for insects and berries, almost always associated in companies, though not very near each other. If a gun be fired, great numbers will start from different parts of the same field. They are always gentle and retiring, and never show any disposition to encroach upon the orchard or the garden. In winter, they resort to the open woods, but in the close, deep forests, they are never found. Some of them are seen with us late in winter; but the great body doubtless emigrate to the south, since they are found at that season in the Floridas, in great numbers, and some retire beyond the limits of the Union.

In the pairing time, these birds select a tuft in the field or meadow, and there construct their nest with coarse grass, with a lining of the same material. It is in the form of an oven, and is ingeniously concealed by matting together the blades that surround it. It is also provided with a retired avenue, through which only one at a time can enter. The eggs are white, blotched, and sprinkled with reddish brown. These birds are very kind and friendly to each other. While the female sits, the male provides her with food and watches over her retreat.

When the young are hatched, toward the end of June, they both guard and provide for them with affectionate care. The lark has few enemies excepting hawks and snakes and young sportsmen. The farmer brings no charge against him, and even children spare the nest and the young.

The BALTIMORE ORIOLE, *Icterus Baltimore*, is perhaps the most splendid of all our summer visiters, and is admired, both for the richness of its plumage and the full-hearted sweetness of its song. It is known by various names; children call it the gold-robin; it is often called the hang-bird, from the peculiar nest which it suspends from the tree, and some give it the poetical name of fire-bird, from its glancing through the foliage like a flame of fire. Most birds of this family remain in tropical climates, where they need an inaccessible nest to secure them from serpents, monkeys, and other artful foes, and when they come to us, they retain the same habit, though exposed to no such dangers. They are not, however, without that prophetic instinct which is so remarkable in many birds. When they build in the south, they make their nest from the light moss, which allows the air to pass freely through it, and, as if aware of the heat which is to come, complete it without a lining; while in the cool and variable climate of New England, they make their nests of soft substances, closely woven, with a warm lining, and hang it in a place where it shall have the early heat of the sun.

The construction of this nest is a singular process of art. The male takes a string, stolen perhaps from a window, and with his bill and claws ties one end to a drooping twig of an elm or some orchard tree. Having secured this, he proceeds to fasten the other end, in the same manner, to another twig drooping parallel with the former, a few inches distant, letting it fall between the two twigs like a swing. The female then comes and fastens another string so as to cross the former, and to keep the twigs in their place as a circular frame-work for the nest. Having thus determined its depth and circumference, they proceed to weave a coarse cloth, with such materials as they can find, forming a pouch, impenetrable to the elements, in the bottom of which they place the real nest, the whole fabric being shaded, by the arbor of leaves above it, from the rain and the heat of the sun. They take such materials as come to hand; skeins of silk and thread, which have been missed by housewives, have been found at last, woven into the baltimore's nest. It is difficult to understand how they can do this without the aid of mechanic art; but Nuttall observed that a tame one was constantly endeavoring to thrust his bill between the closed fingers, in order to force them open; which helps to explain the manner in which they open interstices and insert threads in the process of weaving. The female lays from four to six eggs, of pale brown, dotted, spotted and lined with dark brown. A day or two before the young are able to leave the nest, they creep in and out, and sometimes cling to the outside. After leaving

it, they are fed and protected by their parents for several days, and then driven forth to try their own fortunes in the world.

The motions of this bird are singularly animated and graceful. They are often seen clinging by the feet, like a rope-dancer, in order to reach some insect from a branch beneath them. In the spring, they feed almost entirely on insects, and it is evident, that, numerous and active as they are, their services must be of great value. Nor can they be accused of doing harm to any extent, natural as it would seem for them to claim some reward for their labors. They are often charged with plundering the pea-vines in the garden; but Dr. Harris has shown that they resort to them for the sake of the grub of the pea-bug, which they draw out from its shelter, and thus protect the vegetable which they are said to destroy. But it is not necessary to plead the cause of this universal favorite; he seems to know the esteem in which he is held, and he builds as readily in the elm that swings over the city street, as on the tree that shades the cottage door in the country.

The Red-winged Blackbird, *Icterus phœniceus*, is well known in all parts of Massachusetts, and though sometimes mischievous here as well as elsewhere, is not disliked and persecuted, as he is in many other states. On the contrary, the pleasant associations of spring are awakened by his coming; some of his notes are agreeable to the ear, and his bright red wing coverts, contrasted with his glossy

black plumage, make him a striking object in the meadows where he resides. As soon as these birds hear the voice of spring, they set out from the southern states for the north, in small flocks, the males singing an invitation for the females to follow. They often reach us before the snows are gone, and are seen laboring to collect worms, grubs and caterpillars, as they walk with a rapid and graceful step over the meadows and fields. They often follow the ploughman to collect the insects turned up by the share, and move with easy confidence, knowing that they may trust his good nature then, if at no other time. In fact, they seem to know, that they can do for us, in the way of exterminating these enemies of all vegetation, what nothing else can; and to take it for granted, that man, who is blessed with reason, will make some use of it and not deprive himself of services which no other creature can render. This calculation, like many others made on human wisdom, is often disappointed, and men and hawks combine to reduce their numbers, but in vain.

The red-wings build their nests in marshes or wet meadows, forming the exterior of coarse dried weeds, lined with fine grass or hair, and sometimes secured to the ground by such cordage as the place affords. The eggs are from four to six, light blue, thinly spotted with dusky. In August the young are ready to associate in flocks, and this is the time when they are found in such countless numbers, feeding upon the corn. Those who make war upon them, resemble the traveller, who, annoyed by the chirping of grasshoppers, alighted from his horse to put them all

to death. When fired upon, they only remove from one part of the field to another; and as for scarecrows, they seem to be rather entertained by such exhibitions of human skill.

The Cow Blackbird, *Icterus pecoris*, is never numerous, like the former, and is so much less inclined to the corn-field than to the insects which are found in it, that it cannot be regarded as an enemy of man. But it is generally detested for other good and sufficient reasons, that is, if we suppose the bird to be a moral agent, and fully acquainted with the enormity of its own proceedings. Inclined to perpetual roving, and having a strong aversion to all domestic cares, the cow-bird contrives to escape them by laying its eggs in the nests of other birds, making them foundling hospitals for its own young. When the owner of the nest returns, for the cow-bird takes advantage of its absence, and when it finds the stranger in its premises, it manifests much uneasiness and agitation. Sometimes it throws it out, but as small birds are the victims on those occasions, it often has not strength for the effort. If that is the case, it sometimes covers up the egg by making a new floor to the nest. If unable to do either, it submits patiently to the imposition. The cow-bird's egg is always hatched first, and the young cow-bird sometimes stifles the lawful heirs by its superior size. The parent bird, however, feeds it, and treats it with more kindness than could be expected under the circumstances; and the foundling, as if aware of his obligation, conducts with decency and respect, mak-

ing various ineffectual efforts to strike a tune, in acknowledgment of the kindness of its benefactor.

These birds are named from their habit of following cattle, to which they are of service, by catching the insects that molest them. They come with the spring, and leave us in October, in company with their cousins, the red-wings, with which they associate very little while here, perhaps because they are remarkable for that philoprogenitiveness in which the cow-birds are so shamefully wanting.

The Rice Bunting, *Icterus agripennis*, which has received its name from the wild-rice, on which it feeds, is much better known among us by the name of *bob-o-link*, a word resembling its notes, some of which are wonderfully sweet. It is not among the pioneers of spring, but whenever it arrives from the south, it is warmly welcomed, and gives great animation to the meadows by its parti-colored dress, its busy chatter, and its queer and lively motions. Here, it does very little injury to the grain, though it is said to be troublesome in the southern states. On the contrary, it is incessantly employed in exterminating crickets, grasshoppers, and ground-spiders, creatures which are especially beholden to those who make war on this beautiful bird. But it is not nearly so much persecuted in New England as in other parts of the country, where it is regarded as delicious food and sent to the markets in great numbers. How far to the south they go on their return, is not certainly known; it is thought, that many of them pass the winter in the West India islands.

The nest of the rice-bird is always among the grass or grain, and composed of coarse grass, lined with that which is finer. The eggs are from four to six, white, tinged with blue, and spotted with a blackish color. As soon as the young are able to fly, they all begin to gather in flocks, the males having put off their summer uniform, and wearing the quaker dress of the females and young. This is the time for their depredations, and immense foraging parties lay waste the fields of the middle and southern states. For this purpose they fly by day, whereas in their migration eastward, in the spring, they fly only by night.

The Crow Blackbird, *Quiscalus versicolor*, is an active and sociable bird, who warns us by his loud clanking note, late in the spring, that he is once more in our fields and gardens, apparently unconscious that there can be any objection. He is one of those creatures, concerning which it is difficult to say whether they are friends or foes; sometimes they are the one, sometimes the other, and it is only by striking a balance between the service and the injury, that we can determine how to regard them. That the grakle pulls up corn for the sake of the seed, is undeniable; but it is also true that it devours immense numbers of insects, grubs, and caterpillars; perhaps it may be possible to secure his services and prevent his depredations; and farmers are now trying to accomplish this object by preparing the seed before it is sown, in some solution which shall make it less tempting to the crow blackbird.

This bird returns from the south early in the spring, and large numbers resort together to some favorite tree, where they associate with each other on the most friendly terms, and keep up a perpetual chatter. They build also in communities, sometimes in bushes, but most frequently in a large tree. The nest is made of mud and coarse grass, with a lining of fine grass and horse hair. The eggs are five or six, green, blotched with dark olive. As soon as the leaves fall, the young set out with their parents, in vast collections, on their return to the south, laying the country under contribution as they go. No matter how much they are fired upon, they think it better to be shot than to starve, and all the efforts of the farmer cannot drive them from his fields. Audubon says that the southern farmers soak their seed in a solution of Glauber's salts, which is believed to make it less palatable to the birds in the spring.

The Black Oriole, *Quiscalus baritus*, is seldom seen in this vicinity, and probably rests here but a little while, on its annual migration. One has been obtained by Mr. Samuel Cabot, jr. in the neighborhood of Boston.

The Rusty Grakle, *Quiscalus ferrugineus*, is much more common than the former, in the western part of the state. On their way to the north, they are in haste, having an immense distance to travel; on their return, they are more deliberate, and are seen in the field in large flocks, keeping company with the cattle. Neither this nor the former rears its young in this state.

The American Crow, *Corvus Americanus*, persecuted as it has been for years, still abounds in Massachusetts, as is testified by the scare crows and other ornamental devices, that embellish our fields in the spring. It is not to be supposed that the sagacious crow mistakes for living beings these productions of the statuary's art; but he easily understands what they are meant for, and makes his depredations in a less public manner than he might otherwise do. His suspicions are always awake, and he exerts a caution, which has given rise to the imagination that he can smell powder; but this, though a common belief, implies a delicacy of sense and a knowledge of cause and effect, quite beyond the compass even of the crow. His bearing in a domesticated state contrasts powerfully with his shyness when wild; he becomes familiar and easy, talks loudly and incessantly, steals and secretes whatever he perceives is valued, opens the door by treading on the latch, and plays a great variety of tricks, some of them laughable, others very annoying. In his wild state, he exerts all this shrewdness in the work of procuring a subsistence. His art is so perfect, that he can, by inserting his bill in the egg of the largest bird, carry it away from the nest to be eaten at his leisure. In this manner, he will bear away, one after another all the eggs in the nest of a wild turkey. His cunning does not arise from want of courage, for he may sometimes be seen chasing a hawk or an eagle, which, pressed

by numbers, is compelled to sound a retreat. In this way he often officiates as a guardian of the domestic poultry.

The crow feeds on almost every thing eatable, without choice or delicacy in the selection. It devours fruits, vegetables, and seeds ; snakes, frogs, and other reptiles are also to its taste ; it does not despise worms, grubs, and insects ; and if hungry, will eat the flesh of animals when so far decayed that even an epicure would reject it. Farmers are very bitter in their feeling toward the crow, but perhaps they would be more moderate in their resentment at his depredations, if they were aware, that the cut-worm has the benefit of all their efforts to destroy the crow. Whether that voracious grub will feel any gratitude for this protection, may be doubted.

The crow selects the most retired places for its nest, forming it of dry twigs interwoven with grass and plastered with mud or clay, with a lining of fibrous roots and feathers. The eggs are from four to six, of a pale green, spotted and clouded with olive or blackish brown. Both the male and female sit, and are remarkable for their attachment to their young, as well as to each other. If any nest is approached, all the crows in the neighborhood gather in crowds and express their disgust at the transaction. As soon as the young are able to fly, the parents introduce them into the community of crows, and they remain in flocks till the spring. It is needless to say that they spend the winter here.

The Blue Jay, *Corvus cristatus*, one of the most graceful and elegant of all the feathered race, is very troublesome to other birds, which he persecutes by stealing their eggs, and sometimes by destroying their young ; but he can hardly be called a nuisance by the farmer, since it is only in winter, that he comes into enclosures in search of food, and then he takes little, except what has accidentally fallen from the corn-house or the barn. In the southern states, his depredations are much greater, and the planters soak their seed in a solution of arsenic, which proves fatal to the robber. These birds are said to abound at the south in winter ; but if any really migrate from Massachusetts, it must be but a small proportion ; since, if a handful of corn be anywhere thrown upon the snow, it will be very soon surrounded with a busy and animated party ; and, bad as their reputation is, no one can help admiring their beautiful colors and lively motions. It is impossible to deny that their reputation is deserved. One of them, in Charleston, destroyed all the birds in an aviary. A flying squirrel was once put into the cage of a blue jay for one night, and on the following day, it was found killed and partly eaten ; but, savage as he is, his courage is not proof ; many smaller birds will drive him away from their nest ; he, therefore, creeps to it in their absence, and will thus steal round a whole neighborhood daily, to devour the new-laid eggs. He sometimes frightens away the smaller birds, by imitating the sparrow-hawk's voice. In this power of mimicry he excels ; and when domesticated, he counterfeits the sounds and voices of the

household so naturally as often to occasion much perplexity and confusion.

The blue jay breeds generally in the United States. Here it makes a coarse nest of twigs and fibrous roots, on some forest or orchard tree. The eggs are four or five, of a dull olive, spotted with brown.

The favorite food of the blue jay consists of chestnuts, acorns and Indian corn. It always breaks the corn; and for this purpose holds it between its feet, and hammers it with its bill. But almost every thing eatable, even potatoes, sometimes are included in its bill of fare, and it should not be omitted, that they render service by destroying insects and caterpillars in great numbers.

The Black-cap Titmouse, *Parus atricapillus*, is better known by the name of Chicadee, an imitation of its note in winter, when it is exploring the trees in all directions, to find insects and their grubs or eggs, which latter form its favorite food. By their labors in this way they are of eminent service, particularly in keeping down the numbers of the canker-worm, a pest which human ingenuity is wholly unable to reach. When these are wanting, they subsist on various seeds, holding them in the claws, and picking them open with the bill. They often come near houses also, in search of small bits of meat, or the crumbs which are swept out at the door. They seem perfectly indifferent to the change of seasons, moving about gaily in the severest day; but they give the spring, when it returns, a warm

and grateful welcome; their plaintive whistle at that time, resembling the words *phe-be*, with rising and falling inflections, is one of the sweetest sounds which announce the morning of the year.

The eggs of the chicadee are laid in holes in trees, which they sometimes excavate with their bills, without the formality of preparing a nest. They are from six to twelve in number, white, with specks of brown red. The young, as soon as fledged, resemble the parents, and associate with them, in a cheerful party, running over trees in all directions, sometimes hanging with the head downward, and leaving no crevice unexplored where insects may possibly harbor.

The Hudson's Bay Titmouse, *Parus Hudsonicus*, which has been hitherto unknown in Massachusetts, has been found by S. Eliot Greene, Esq. near his house in Brookline.

The Cedar bird, *Bombycilla Carolinensis*, is well known, or as some would say, notorious, and not so generally welcome as one might suppose, who regarded only the silken delicacy of its plumage, and the insatiable appetite with which it gathers caterpillars, beetles and cankerworms from the trees. The reason is, that in the season of fruit, they repay themselves by eating cherries, pears, and other luxuries with so much relish and so little discretion, that they have been known to gorge themselves to death. When they alight upon a tree, they are so crowded together that many may be killed by a single shot. They immediately spread themselves

over the branches, picking the fruit faster than their mouths will hold it; and not suspending their labor for an instant, except to invite other flocks that may be passing over, to descend and share it with them. If the horticulturist, who sees the results of his labor disappearing, undertakes to prevent it, he only wastes his powder; that some of their number are shot, is a matter of unconcern to the survivors; he may gratify his revenge, but the scene of plunder will go on before his eyes; and he can only console himself with the reflection, that, in proportion to the appetite with which they devour his fruit, is the energy, with which, at other seasons, they take his part against enemies which he himself cannot reach. The truth seems to be, that, till fruit becomes more common, as it doubtless will be, these depredations will continue to be vexatious and discouraging; and the better way will be, to accept them as an intimation, to provide enough for ourselves and the cedar-birds too.

There are some things curious and unexplained in the habits of this bird. They may not unfrequently be seen sitting in a row; when one who has found a favorite morsel, hands it to his next neighbor, he, instead of eating it, passes it on, and thus it goes round, each one declining it with a Parisian nod of his tall cap that is perfectly irresistible. What this ceremonious display may mean, it is not so easy to tell. They have also a habit, when wounded, of remaining still and stiff, as if dead, and will suffer a person to take them up in his hand, without the least effort to resist or get away.

They generally build, in the orchard, a carelessly constructed nest, of coarse grass lined with fine. The eggs are about four, of a purplish white, marked with black spots, larger toward the great end. The young are fed at first on insects, and afterwards on fruit. The parental affection of the old birds is not exemplary, since, if the nest is approached, their impulse is to take particular care of themselves. Gentleness, however, is the uniform characteristic of this bird. It comes to us in the beginning of April, and remains till late, being a northern bird, and capable of enduring cold.

The Waxen Chatterer, *Bombycilla garrula*, is a bird hitherto supposed to be unknown in Massachusetts; but I learn from Dr. Brewer, that an individual of this species was pursued in this State by the younger Mr. Audubon, who is familiar with birds of all descriptions. It must therefore be set down as a visiter in our State, though probably accidental.

INSECTIVOROUS BIRDS.

The Great American Shrike, *Lanius septentrionalis*, is commonly called the Butcher bird, from its habit of destroying other birds. It pursues them with a vigor from which they cannot escape, and strikes at them, even when kept in cages and under the protection of man. There have been many cases

in which it has thus risked its own life and liberty in order to secure its prey. But Wilson was of opinion, that grasshoppers and other insects were its main dependence for food, and that it was only when pressed with hunger, that it preyed on other birds. Still, it has the habit of imitating the notes of other birds, particularly such as indicate anxiety and distress, and it does it apparently for the purpose of bringing the companions of the supposed sufferers within its reach.

All who have paid any attention to this bird, have remarked its curious habit of impaling on thorns the insects it has caught, and there leaving them to decay. This practice of gathering what he does not want, and keeping it till it can be of no use to him, is regarded as an unaccountable mystery in a bird, while in man, the same proceeding is considered natural and wise. It can hardly be meant as a decoy, for, as just stated, it has the power of attracting other birds by false appeals to their sympathy, and does not need to take this trouble. It may sometimes be heard sending out these false alarms, and when the poor birds collect, in anxiety to learn what the matter is, it darts at one of them, and fills the air with the cries of a real victim.

Though the feet of this bird are small, the claws are sharp, and can inflict a severe wound. Its flight is bold and strong, and on this it depends for securing its prey. It is seldom, if ever, seen walking on the ground. At the approach of spring, most of them leave us, though some are said to pass the summer in the forests of New England.

The AMERICAN GREY SHRIKE, *Lanius excubitroides*, is said by Nuttall to be seen in winter in the vicinity of Boston.

The KING-BIRD, *Muscicapa tyrannus*, is with us from the middle of May to September. All this time he labors diligently in our gardens, destroying beetles, crickets, grasshoppers, and cankerworms, without claiming any reward. In fact, he seems to take the whole farm under his protection, and if a hawk ventures near, he attacks him with so much fury, flying over him and plunging on his head and back, that the hawk, and even the eagle, is glad to leave the field. The only instance in which he is supposed to do mischief, is in catching the bees as they are engaged among the flowers. This, however, is not common enough to be a subject of complaint or revenge. The king-bird fears no enemy except the purple martin, which has the advantage in its superiority of flight; thus on many occasions, they combine their forces to repel any intruder upon their bounds.

The king-bird's nest is constructed of coarse stalks of grass, with flakes of wool, tow, or down, woven in between, and lined with fibrous roots and horse hair. The eggs are from four to six in number, blush-color, spotted with brown. They are very affectionate toward their young. I once observed a pair building on a decaying tree, apparently unaware that all the branches of the tree were dead, except the one which contained their nest. When the young were

hatched, the weather became intensely hot, and the nest was entirely open to the sun. In order to shield their offspring, the old birds stood, by turns, on the side, with their wings spread so as to overshadow them. The position was evidently constrained and painful; they panted with the effort and the heat; but they did not grow weary of it till the weather relented, and the protection was no longer needed by the young. If a cat appears in the vicinity of their nest, the king-birds attack her so violently that she is glad to retreat, though somewhat ashamed to yield to such a little foe.

The Great-crested Flycatcher, *Muscicapa crinita*, is spoken of by Nuttall, as nearly unknown in New England. It is probably more common in other parts of the State than in the vicinity of Boston; though I learn from Dr. Brewer, that Mr. Cabot, who is familiar with the bird, has seen it in Cambridge. Professor Emmons assures me that it breeds in Berkshire. It is doubtless one of our birds, but not numerous enough at present to be of much importance. It is difficult to say why its reach of migration should be less than that of other birds of its tribe, which do not equal it in hardihood and power of flight, nor can any natural cause be imagined which should prevent its going farther to the north than our southern border. Its food, consisting of insects, grapes, and berries, such as those of the poke-weed, can be found any where. It was probably some accidental preference in the beginning, afterwards continued from habit, which confines this species to the southern parts of New England.

The Pewit Flycatcher, *Muscicapa atra*, commonly known by the name of *phœbe*, is a familiar and welcome bird; not valued for its beauty or its song, in both which respects it is deficient, but held in general esteem, because it reposes confidence in man. Its favorite resorts are bridges and barns, and similar frequented places. It prefers the vicinity of water, but this is not indispensable; it cares rather for a good hunting ground for insects, and as these are most abundant in the places just mentioned, the phœbe generally selects them. There it sits on some roof or post, singing its song, such as it is, occasionally suspending it to dart after a passing fly. As these birds are active and successful in this pursuit, the domestic cattle are not a little benefited by their labors.

The phœbe returns from its winter quarters in the beginning of April. At first it resorts to the woods, but soon comes into the village to select a place for its nest. It is remarkable for its local attachment, and will return to the same place, year after year, even when it has been disturbed repeatedly in its possession. It builds under bridges, in caves, or the sides of wells, under the eaves of buildings, or in barns, making the nest sometimes on the top of a beam and sometimes attaching it to the side. The eggs are about five, of a pure white. As the nest and the young are so little concealed from observation, they are often destroyed by boys, taking early lessons in inhumanity, and their parents little suspect how much such practices can do to brutalize the character and moral feeling. Audubon

gives a very interesting account of a pair, which became so familiar with his presence, and so well satisfied of his good intentions, that they made no objection to his going up to their nest and handling the young. He tied threads round the legs of some; but, not having any particular need of garters, they or the old ones, always contrived to remove them. He then made use of silver thread, which they could not displace, and the next year found that some of those thus distinguished, had returned to the same spot. After an absence of two years, he revisited the spot, and found that one of the birds knew him, while the other was distrustful and shy. On inquiry, it appeared that a boy had killed the female and her young, and that the old male had brought home a second wife, who knew nothing of him as a friend of the family, while her husband remembered him well. Before the country was settled, the phœbe, no doubt, built its nest on the rocky banks of streams; but finding an advantage in acquaintance with man, it has left its old haunts, when better can be found.

The Olive-sided Fly-catcher, *Muscicapa Cooperii*, is described by Nuttall, who first discovered and gave it a name. He says that it is doubtless the same with the *M. borealis* of Richardson, though he became acquainted with it before the publication of the "Northern Zoology." The nest of this bird is said to resemble that of the king-bird, and the eggs, those of the wood pewee. Audubon confirms the fact that this bird is found in Massachusetts, but

the line of its migration he has not been able to ascertain. He considers it as a new comer into the country.

The Wood Pewee, *Muscicapa virens*, is a very common summer bird, and may be regarded as very useful, since, though solitary in its tastes and habits, and preferring the shelter of the woods, it is very often found in orchards and fields. It resorts to the most shaded parts, not from any fear or distrust of man, but because, having the power of seeing in the obscure twilight, it does not love the glare of day. It arrives in Massachusetts in the middle of May, and may then be seen perched on low stakes or branches, occasionally darting after insects, which it secures with a snap of the bill. Its song, heard in the dusk of evening, is pleasant, and harmonizes with the calmness of the hour.

The nest of the wood pewee is generally built on a horizontal branch, somewhat after the manner of the humming bird's, and coated over with moss, so as hardly to be distinguishable from the bark. The eggs are three or four, of a yellowish white, spotted with lilac and brown. In autumn, when the young are full grown, the parents bring them into our villages, and even our cities, and teach them to procure their food. They sweep so near the surface of ponds, as to snatch the insects floating on the water; sometimes they chase them from the top of the highest tree. Before the leaves are fallen, they are gone to their winter home.

The Small Pewee, *Muscicapa Acadica,* is a very common summer bird, which comes to us from the far south, toward the close of April, and returns in September. Like the former species, it prefers retired and shaded places, where it sits quietly on a low branch, waiting for insects to come near. When they appear, it takes a sweep and secures them, and then returns to its station. Its note is sharp and not pleasant; but the bird is fearless and familiar, not removing from one who passes by, till he comes almost within reach. Like all the rest of this tribe, it is eminently useful in destroying flies, moths, and various other insects, which are troublesome to man and beast; on this account, they all should be treated with encouragement and regard.

The nest of the small pewee is sometimes on horizontal branches, sometimes in the upright forks of a tree. It is composed of dry grass woven with wood, down, and other soft materials, cemented together with the saliva of the bird. The eggs are five, of unspotted white. While the young need support and protection, they remain with their parents; but afterwards, they separate into different parties, to migrate to their winter quarters.

The American Redstart, *Muscicapa ruticilla,* is a very beautiful bird. It is not rare, but is seldom seen, because it lives retired, and, when it comes into our gardens, confines itself to the shade. It is in constant motion, exploring the branches, and moving its tail and wings so as to display its rich

colors; sometimes it starts up to catch an insect flying over; then it may be seen balancing itself in the air, looking sharply into a bunch of leaves. It flies with the mouth open, and its success is known by the snapping of its bill. When it tries to seize a wasp, the insect presents its sting in so formidable a manner, that the redstart dares not catch it, and moves after some less dangerous prey.

In the cold weather in June, 1832, when so many birds were found lying dead, in all parts of the country, one of these birds came, for several days in succession, up to my study window, and there employed himself in catching insects, within a few feet of the place where I was writing. He frequently watched me, but finding that I did not trouble him, he dismissed his reserve and seemed to be on familiar terms. When the weather changed, he disappeared, and I never saw one in the same place again.

The nest is generally on a low bush or tree, and appears as if hanging by the twigs. It is composed of various materials, fastened together with saliva. The eggs are a soft white, sprinkled with yellowish brown. The parents are anxiously watchful for the safety of their young. These birds come to us in May, and, at the last of September, retire beyond the limits of the Union.

The Small-headed Flycatcher, *Muscicapa minuta*, is a species first discovered by Audubon. Little is yet known concerning it, though ornithologists have been acquainted with it for a considerable time. Dr. Brewer informs me that it has been found in

Ipswich, and that he picked up one of them, evidently just dead, on the step of his door in Brookline.

The BLUE GREY FLYCATCHER, *Muscicapa cærulea,* which was formerly thought to proceed no farther to the north than New York, is, I am told by the same gentleman, found in Massachusetts, and as far as the Canada line. Professor Emmons tells me that in Berkshire, the preceding species is common, but that he has never met with this.

TRAILL'S FLYCATCHER, *Muscicapa Traillii,* a bird discovered by Audubon, and named by him in compliment to Dr. Traill of Liverpool, is also found in our State. A specimen was obtained by Mr. Samuel Cabot, Jr. in the neighborhood of Boston. It has probably been seen and mistaken for the small pewee, which it so much resembles, that some ornithologists regard them as the same. The difference in the size and markings is trifling; but the tail, which in the former is even, is slightly emarginate in this. Nuttall, however, describes the tail of *M. Acadica* as decidedly emarginate, and not, as Audubon says, even, and slightly rounded.

The GREEN BLACK-CAP FLYCATCHER, *Muscicapa Wilsonii,* is enumerated among the birds of Massachusetts, on the authority of Audubon. It is very rare in this State, though common enough in Maine.

The CANADA FLYCATCHER, *Muscicapa Canadensis,* which, like the preceding, is often classed with

the warblers, is not now uncommon in this State, however it may have been in former years.

The Yellow-breasted Icteria, *Icteria viridis*, certainly makes occasional visits here, though it is generally described as not passing the bounds of our adjoining states. Professor Emmons assures me that he has found it in Berkshire. Their ordinary migration does not extend so far, but in the middle states they abound.

The Yellow-throated Vireo, *Vireo flavifrons*, is one of a beautiful family of singers, some of which are quite familiar, and highly valued for the sweetness of their song. This is not the most musical of their number, but its note is pleasant, resembling that of the red-eye. It prefers the solitude of the forest to the society of man, and there employs itself in exploring the branches of the largest trees, in search of its insect food; passing over each with short hops, examining every leaf and bud, in order to be sure that nothing is left undetected. There it may be found from May to September, when it retreats to the warmest parts of America.

Its nest, like that of other vireos, is suspended from the branch of a tree, being attached to the twigs with slender strings, mixed with the threads of caterpillars and fine blades of grass, cemented with the saliva of the bird. The whole is covered with green moss, attached by threads of silk, and resembles the foliage in color so much as to deceive,

or rather to elude the eye. The eggs, four or five in number, are white, spotted with black. When the young are hatched, it conducts them into orchards and gardens, in search of berries for food.

The White-eyed Vireo, *Vireo Noveboracensis*, comes to us in April, and passes the summer in our State, where it appears to be much more abundant than the former, because it is more retired. Its song and its motions are energetic and animated; it passes from twig to twig in quick succession, glancing up and down so quickly, that nothing can escape it, sometimes swallowing an insect, then stopping to drink a dew-drop that hangs upon the leaves. Its song is spirited and emphatic, with considerable variety of expression, and more powerful than could be expected from so small a bird. This bird suspends its nest, like the former, but not high in the air; it is generally hung from the branch of a brier or a vine, and composed of bits of hornets' nests, newspapers, or grass woven in with twigs, with a lining of root-fibres. The eggs are four or five, white, with a few brown spots toward the larger end. If any one approaches the nest, the vireo scolds with great heat and passion. At other times, it seems quite indifferent to his presence, and looks at him with perfect composure, at the distance of a few feet.

The Warbling Vireo, *Vireo gilvus*, is a charming singer, and so unwearied in its various and animated warble, that it is one of the chief attractions of a summer day. Its notes, so mellow and flowing,

cannot be mistaken for those of any other bird; neither is any one who hears it at a loss to trace it to the performer, who never retires to the forest, and seems to delight in the society of man. At the same time his note is unambitious, and gives the listener the impression that it was not intended to be heard, but was simply an unconscious outpouring of the harmony and happiness of his breast. In this unpretending manner, he differs from most other birds of sweet note, which appear as if fully aware of their powers, and desirous to display them.

The nest of the warbler is suspended high in the air, formed of blades of grass disposed in a circular form, with bits of hornets' nests, corn husks, or old apple blossoms, inserted between, and kept in place by threads of caterpillars' silk; the lining is of fine grass, pressed into the proper form with great care. The eggs are four or five, white, spotted with reddish black at the larger end. These birds remain with us from May to October, when they leave us reluctantly for the tropical regions. They are not, like the red-eye, seen in Florida in the winter.

The Red-eyed Vireo, *Vireo olivaceus*, is, perhaps, more common than the former; not equal to the warbler in its song, which is rather broken and interrupted, than easy and flowing; but, nevertheless, is expressive and sweet, resembling that of the robin, though not so clear and strong. From May to August it sings all day, without ceasing, never oppressed by the severest heat; at every short suspension of its song, it moves up and down the branches,

searching every bud and blossom, and peeping under the leaves. The cloudy weather, which is so depressing to most birds, has no effect upon the red-eye; he sings as cheerfully in the dark afternoon as in the brightness of the rising sun, seeming to hold a perpetual festival, and quenching his thirst with the drops of dew.

The nest of the red-eye is suspended at various elevations, but never so high above the ground as that of the warbler. It is more particular in lining it than in building. The materials of the nest are miscellaneous; the lining is of fibrous roots, pine leaves, and strings of the bark of vines, disposed in beautiful order. In it are three or four eggs, white, with spots of brown at the larger end. The red-eye is an attentive parent, and, for this reason perhaps, the cow-bird often chooses it as the nurse of its young. The eyes of the young birds are brown, and do not become red till the following spring. A species alluded to in Audubon's description of the red-eye, as resembling it, but quite distinct, and which he promises to describe in his fourth volume, is, as Dr. Brewer informs me, sometimes seen in our State.

The Mocking-bird, *Turdus polyglottus*, is rarely seen in Massachusetts. The brown thrush is sometimes mistaken for it by careless observers, and that fine bird, though not an imitator, at least to any great extent, has a depth, sweetness and variety of song, which even the far-famed mocking-bird cannot exceed.

The Brown Thrush or Thrasher, *Turdus rufus*, must be regarded as the finest of our singing birds. It is also very common, though not as familiar as some others. From the time of its arrival, about the first of May, it may be seen, on the high twig of some tall tree, pouring out its soul in a full and flowing strain, not changeful and capricious, like that of the mocking-bird, but uniformly eloquent and sweet. It may be fancy, but the song seems more in harmony with the season than any other, and more resembling what we imagine of the voice of spring.

In point of strength and intelligence, the brown thrasher is superior to all the birds of its class. It bids defiance to large and powerful birds of prey; if a cat or a dog come near its nest, it attacks and chases him away; and the snakes which are tempted to rifle its nest, which is generally on or near the ground, are beaten in such a manner that they are glad to make an early retreat. These birds have many contests among themselves, but if the least alarm is given, they suspend hostilities at once, and join in hearty alliance against the common foe. As to its intelligence, it appears at once in those which are domesticated. Mr. Bartram observed that one which he reared from the nest, if he found that crusts of bread, which were given him as food, were too rough for him to swallow, would take them to his water-dish and soak them. He was also fond of wasps, but before he swallowed them, would examine to see if they had a sting; and if so, would carefully remove the poison before he ventured to

eat them. The food of the brown thrasher consists of insects, worms, berries, and fruits of all descriptions. They are sometimes accused of pulling up the new corn, but this is so seldom done, that it is doubtless accidental, and the grub, instead of the corn, is the object which it aims to secure.

The nest is built on the ground, or a few feet above it, with small twigs and dry leaves, strips of bark and root fibres. The eggs are of a buff color, thickly sprinkled with dots of brown. Both the male and female sit, but the time of the former is very much occupied in keeping guard against the approach of enemies, which he resists, if it is possible, and if not, attempts to soften to compassion by his plaintive cries. If any one plunders the nest, both parents follow him with alternate imprecations and appeals to his feeling. After the breeding season, they are generally silent, and are found in gardens in great numbers, where they employ themselves till October, when they retreat to the southern states.

The CATBIRD, *Turdus felivox*, is strangely persecuted, though he deserves good treatment on account of his services, which are great; and also on account of his song, which is fine and sweet when he feels secure; but this is not often; for he seems fully aware that a bad name has been given him; and his cat-like *mew* is an expression of his anxious fears. Beside his own wild snatches of melody, he gives many broken imitations of other birds, but never seems sufficiently easy in his mind to finish the

strain he has begun. Latham says, that in a domesticated state, the catbird has been taught to imitate the strains of instrumental music; and that he will counterfeit the cry of young chickens in distress, so as completely to deceive the parent hen. His attempts to mock the notes of other birds can be easily detected in listening to his song, and blended in with his own original strains, form an anthem so singular, that no one who has the least portion of taste or fancy, can hear it without delight.

The catbird remains with us from May to October, constantly employed in picking off wasps, worms, grubs, and various insects, and, at the season of fruit, it ventures to claim some little reward for its labors; not so much however, as would have been consumed by the wasps alone, which it has destroyed. It seems surprising, considering how they are treated, and how sensitive they appear to be, that they have not long ago deserted us. But the nervous anxiety which they betray in their voice and motions, is not really owing to anxiety for themselves, so much as to affection for their young. They are quite discriminating in their apprehensions; the sight of a dog does not disturb them, but a cat throws them into a fever of dread; and while they are wretched the moment an idle boy enters the garden, they will permit some men to handle the eggs in their nest.

The nest is in a bush or a vine, composed of twigs, strips of bark, old grass and dry leaves, with a lining of root fibres. The eggs are four or five, of a deep green. It is not easy to make them give

up their nest; if it is carried away, they will follow it, and retake possession as if nothing had happened. In cases where the young of other birds have been put into their nests, the female has thrown them out to make room for her own; but the male, observing their distress, has taken compassion on the orphans, and fed them as his own. Surely, this is not a creature at which it is wise for man to cast the first, nor indeed to cast any stone.

The American Robin, *Turdus migratorius*, is not the earliest, but is certainly the most welcome messenger of spring; and the confidence which he places in us is seldom disappointed, except by boys taking their first lessons in cruelty, in which they afterwards become masters. His note is hearty and joyous, sometimes very musical, but always associated with spring-blossoms and early fruit so inseparably, that his song reminds every one of something which he loves to remember. His familiarity is his greatest charm; and he often disarms bad intentions, by alighting near us with a look and manner which seem to say, that, bad as men are, he does not think they mean to injure him. He is greatly respected by children on account of the name which he bears; they mistake him for the redbreast, which is said to have displayed so much humanity to the children in the wood; but, though our robin is not often called to such benevolent exertions, there is no doubt, that in any similar case of distress, it would show itself as kind and thoughtful as the other.

The robin well deserves the name of migratory,

though some remain with us in ordinary winters, retreating from the cold into the depth of evergreen woods. They spread themselves over the whole continent; they are found in all the fur countries, and almost all places where man has ever been. They are never stationary, except when rearing their young; for we sometimes find that in the summer, they will leave a place where they have abounded, and for days together not one of them can be found. Their movements are irregular, depending probably on the supply of food which they find in different parts of the country. They migrate in large flocks, flying high and far without resting; sometimes, if the weather is fine, they continue their course by night.

The nest of the robin is found in various situations, most commonly in an orchard tree. It is composed of dry leaves, grass and moss, connected together by mud; the lining is of fine grass, sometimes in part of feathers. The eggs are from four to six, of bluish green. It is not necessary to be particular in these matters, the nests being almost always made near human dwellings, and often within the reach of man. It is supposed that it chooses these resorts in order to escape from the cuckoo, which sucks its eggs wherever it dares venture; but the robin soon forms a strong local attachment, and often returns in successive years, not only to the same spot, but the same nest which it has occupied before. One has been known to build in the stern timbers of an unfinished vessel in New Hamp-

shire. They are very affectionate to their young, and if an accident happens to one of them, the whole neighborhood of robins is in alarm.

The robin is easily domesticated, and soon becomes very fond of its owner. It shows a taste and talent for imitation also, which does not appear in its wild state. It will not only mock the notes of other birds, but will imitate tunes which it has often heard. In this state it has been known to live for nearly twenty years.

The WOOD THRUSH, *Turdus mustelinus*, is a retiring bird, but not so solitary as it is sometimes represented. It is most partial to shaded glens, where it sings toward the close of day. Its note is very remarkable; with notes of no great variety, but clear, flowing and silvery as a sweet-toned bell; of all the voices of summer there is none so thrilling, particularly when heard as the shades of night are falling, and in scenes of deep repose. Each bird seems to have some favorite resort of his own. It is generally in some deep hollow, overhung by large trees festooned with vines, where the sunbeams at midday can hardly reach the ground. Here it delights to sing; and no one can hear it without having his mind calmed by the spirit-like melody, and the harmonious quiet of the scene.

This bird is a constant resident in Louisiana, but whether, or how far it goes beyond the limits of the United States, is not known. It comes to us in April, performing its migrations in the woods, and seldom appearing in the open country. Its nest is

built in shrubs or low trees, saddled on the branch, and composed of grass and leaves held together by mud, with a lining of root-fibres. The eggs, four or five in number, are of a greenish blue. The young come out from retirement into gardens, and are even known to visit the outskirts of the city. They are easily raised in confinement, and sing nearly as well as when free.

On alighting on a branch, the wood thrush gives its tail a jerk two or three times with a peculiar chuckle. It walks and hops on the branches, occasionally bending down to look round it. It often descends to the ground, and scratches in search of worms and beetles, but the least alarm sends it back to the tree. It never commits depredations of any kind whatever. These birds are never seen in flocks; they pair in the breeding season, but at all other times are found single and apart from each other. They do not leave New England till quite late in the fall.

The Hermit Thrush, *Turdus minor*, is described by Audubon and Wilson as destitute of song, while Nuttall represents it as hardly inferior to the nightingale in the power and sweetness of its voice. There are some other points of difference in their several descriptions. Audubon says that the bill is dark brown, yellowish toward the base of the lower mandible. Nuttall says that it is black above and flesh colored below. Audubon says that the tail is even, while Wilson and Nuttall speak of it as forked. These and some other discrepancies I am unable to

reconcile, from want of acquaintance with the bird. Nuttall however sets it down as passing the summer in our woods.

WILSON'S THRUSH, *Turdus Wilsonii*, is described by Nuttall as a common bird, resembling the wood thrush in its voice and song. He describes its nest as usually made in a low bush, not much above the ground, and depending for security on its resemblance to the foliage where it is built. No earth is employed in its construction. The eggs are four or five, of an emerald green. This and the preceding species are not yet sufficiently known.

The NEW YORK THRUSH, *Turdus Noveboracensis*, which, according to Nuttall, hardly ever comes here except in autumn, arrives, as Dr. Brewer assures me, in the spring, and rears its young in our State. Its nest and eggs have been found in Roxbury.

The GOLDEN-CROWNED THRUSH, *Turdus aurocapillus*, is a very timid and retiring bird, which remains with us from May till September. It is not distinguished by any power of song, though it has a succession of simple notes which sound pleasantly, in its quiet and solitary home. It sits and runs on the ground like the lark, and the moment it is discovered, escapes from observation in the deepest shade of the woods.

This bird is better known by its curious nest than by its aspect or its song. It is built on the ground, among dry leaves or decayed moss. It is neatly con-

structed with grass, inside and out, and is arched over with a large patch of the same material, overspread with twigs and leaves, so as to resemble the rest of the ground. An entrance is left at the side, which is generally toward the sun. The eggs, from four to six in number, are white, spotted with brown toward the larger end. If the female be discovered on her nest, she creeps swiftly and silently away. If she sees the intruder looking for the nest, she flutters, pretends lameness, and generally succeeds in drawing off his attention; but she suffers much from snakes and other animals, which are not easily deceived, and cannot be resisted. These birds live on insects, particularly such as they find upon the ground.

The Yellow-crowned Warbler, *Sylvia coronata*, sometimes called the myrtle bird, is quite common here for two or three weeks in May, and after an absence of more than three months, it reappears on its way to its winter home. While here, they are very social among themselves, and come fearlessly about our houses, entirely unsuspicious of danger, collecting the insects on which they feed. They breed in the northern regions. In autumn, they return with a less brilliant dress than in spring, which may be either a decided change in plumage, or possibly only the result of wear and travel. Their song, as well as some of their habits, bears a strong resemblance to that of the summer yellow-bird. Audubon found the young in Labrador; but the only nest he has ever seen, was presented to him in Nova

Scotia. It is very much like that of the bird just mentioned, lined with thistle-down, hair, and feathers, and containing four rose-colored eggs, dotted with reddish brown, around, but not upon, the larger end.

The Yellow Redpole Warbler, *Sylvia petechia*, comes to us, like the former, after passing the winter in the southern states. Here it is a rare species. Audubon found the birds abundant at Labrador, but sought for their nests in vain.

The Summer Yellow-bird, *Sylvia aestiva*, is a beautiful summer resident, and a favorite in all parts of New England. Its delicious warble, though it has no great variety, is one of the sweetest sounds heard at the window on a summer day. They probably spend the winter beyond the limits of the Union. Early in May they return, and are seen in all directions, darting through the foliage in search of insects, their golden yellow dress richly contrasted with the fresh and tender green. The male comes a little earlier than the female, as if to explore the way. They soon begin to construct their nest, which is generally near our dwellings, and sometimes within reach. They make use of hemp, flax, and cotton, soft grass, and hair; but they are not particular in their choice of materials. The eggs are four or five, of a dull white, speckled with brown toward the larger end. This bird is very much annoyed by the cow-bird. Sometimes, when it finds the strange egg, it buries it by making a new lining to its nest; but

if this be impracticable, it feeds and protects the foundling with as much kindness as its own young. In its migrations, this little bird travels by night.

The Spotted Warbler, *Sylvia maculosa*, is a beautiful bird, which passes through the State in May, on its way to the north, where it rears its young. Here they are always rare; but in Maine they are sometimes exceedingly common, being detained there, waiting till the season is sufficiently advanced to permit them to go farther. This bird excels in song as well as in beauty of plumage; its motions are graceful, and, when on the ground, it holds its wings drooping, as if to display their markings to advantage. They pass but a few days with us, and, on their return, do not visit us; they probably, in returning, avoid the coast, and make their way along the course of the great western rivers.

The Black-throated Green Warbler, *Sylvia virens*, is not common in Massachusetts. It comes from the south in May, and may be seen searching the blossoms of the apple tree for food, so intent upon its employment as to pay no regard to the presence of any observer. Sometimes the chipping-sparrow, delighted to find a bird weaker than itself, puts on airs of state, and orders the little warbler away from the tree. A few spend the summer in the northern states. Their nests are not easily discovered, but Nuttall met with one in a juniper, on the Blue Hills in Milton. It was made with strips of bark, horse-hair, and feathers, and contained four eggs, inclining

to flesh-color, dotted with purple together with large spots of brown. There was no other nest of the kind near it. These birds are seen roving in the forests, on their way to the south, in October.

The Blackburnian Warbler, *Sylvia Blackburniae*, is sometimes seen in this State, and, whenever it appears, its elegant colors attract attention. In the list furnished me by Dr. Brewer, it is marked as breeding in this State. Its nest, however, is not often seen. Audubon received one from Professor MacCulloch, of Nova Scotia; it was composed externally of different textures, and lined with silky fibres and thin delicate strips of fine bark, over which lay a thick bed of feathers and horsehair. The eggs were white, with red spots toward the larger end. It was found in a small fork of a tree near a brook, five or six feet from the ground. It is seldom that this bird appears here, except in May and September, on its annual migration and return.

The Orange-throated Warbler, *Sylvia auricollis*, is another rare and transient species, which makes us a passing call, on its way to Canada.

The Chestnut-sided Warbler, *Sylvia icterocephala*, passes through this State on its way to the north. In 1837, they were quite common near Connecticut river. Audubon professed himself ignorant of their breeding places; but Mr. James Eliot Cabot has succeeded in finding a nest in Brookline, in our State.

The Bay-breasted Warbler, *Sylvia castanea*, comes to us about the middle of May, and remains a few days. In its appearance and manners it strongly resembles the preceding. While here, it is busily engaged in searching for insects, along the hedges and in the highest trees. Where it goes when it leaves us, is not yet distinctly known. Audubon says that he has often seen them in Louisiana, in the month of June, which would indicate, that, unlike the warblers in general, they remain and breed in the southern states. But if it is so, their nest has not yet been found.

The Black-pole Warbler, *Sylvia striata*, is not uncommon in the latter part of May, when it is seen in the orchards in pursuit of cankerworms and other food. Its note is a low clinking sound, that can hardly be called a song. Audubon was fortunate enough to find its nest at Labrador. It was built on a fir tree, about three feet from the ground. There is something curious in the manner in which this and other warblers, in their migration, skip over some parts of the country.

The Pine Warbler, *Sylvia pinus*, is a summer resident in the State, but not much known, because it resides in deep, evergreen forests, where it explores the bark and buds of trees in search of the insects which infest them. Nuttall describes a nest of this species, which he found at Mount Auburn, on a tree, forty feet above the ground. The eggs were white,

with a very pale tinge of green, and thickly sprinkled with pale brown. In summer, their food consists of insects, and their eggs and larvae; in autumn, when the young accompany their parents, they come into gardens and groves. One which Nuttall domesticated, fed on flies and worms that were offered him, without the least timidity; and was so tame and familiar as to be in danger of being trodden under feet.

The Autumnal Warbler, *Sylvia autumnalis*, is not at present known to rear its young in Massachusetts, but it cannot go far for that purpose, since it is found in our forests, attended with its family, as early as the month of July. Early in the season, they are seen darting through the woods in search of flies. One which Nuttall obtained, by its flying in at an open window, soon pursued the house-flies, as if nothing had happened, and became so sociable that it would eat from his hand. In the autumn, it may be seen turning over the fallen leaves, or searching the chinks of fences and the rough bark of trees. Its nest has been found in Pennsylvania, and also near Lake Champlain.

The Hemlock Warbler, *Sylvia parus*, differs so little from the *pine*, that Nuttall is inclined to regard them as the same species; but Audubon, who procured many specimens, together with a nest and young, pronounces them distinct, and it is on his high authority that this is set down among the birds of our State.

The Prairie Warbler, *Sylvia discolor*, is a small and quiet, but fearless bird, which comes to us about the middle of May. Nuttall found one of their nests at Mount Auburn, in a low barberry bush, formed very much like the nest of the yellow-bird. The proprietor eyed him with much curiosity, but without any appearance of fear, and when he approached the nest, the female kept her station. There is considerable difference in the accounts given by him and Audubon, of the nest and the song of this bird. The latter describes the nest as covered with lichens, like that of the humming-bird. The one found at Mount Auburn did not answer at all to his description.

The Parti-colored Warbler, *Sylvia Americana*, is not common, but several specimens have been obtained by Mr. Samuel Cabot, Jr., and as its song has been heard here as late as the close of May, there seems reason to believe that it sometimes breeds in the State. It comes in May and returns in October, on its way to its winter home in the West Indies. Few of the warblers are more beautiful than this.

The Black-throated blue Warbler, *Sylvia Canadensis*, is a wayfaring and unfrequent visiter, which appears in April, on its way to the north, and returns late in the fall. It is not known where it rears its young. Its winter quarters are in the West Indian Islands. The Pine Swamp Warbler, *Sylvia sphagnosa*, is now believed to be the young of this species.

The MARYLAND YELLOW-THROAT, *Sylvia trichas*, is one of our most common birds, found among the alders of almost every brook, from the beginning of May till the leaves fall. It is quiet, humble, and never ambitious to be seen; still it shows no distrust nor fear of those who visit its retreats in shady hollows, except when they go so near the nest as to create apprehensions for its young. Its song is simple, pleasant, and suited to the places where it resides.

These birds commence building their nest in May. It is in thickets, on or near the ground, among dry leaves, brush or withered grass, which may protect it from observation. It is made of dry sedge grass and leaves, with a lining of fine bent grass. The eggs are about five, of a soft white, with specks, blotches, and sometimes lines of brown, chiefly toward the larger end. At the close of July the male ceases to sing, and the old and young rove about in parties till the season warns them to depart.

The MOURNING WARBLER, *Sylvia Philadelphia*, is a rare species, but Dr. Brewer assures me that he has seen it here in summer. Very little is known of its habits, and I believe, nothing whatever of its nest. *Sylvia agilis* is now believed to be the young of this bird. Prince Bonaparte believed that the mourning warbler would turn out to be an accidental variety of the species just described. It is said, however, to be quite different in its song.

The WILLOW WREN, *Sylvia trochilus*, is the same

which, in England, is called the hay-bird. Nuttall says that it visits us in October, when it feeds on flies and other insects, and often is seen rising with a low and pleasant song from the tops of trees. It is named from its attachment to the willow.

The Worm-eating Warbler, *Sylvia vermivora*, arrives from the south late in the spring, and retreats early, before the northern storms. It was not known to breed in this State till a nest was discovered in Cambridge by Mr. Rotch, who gave a specimen of the eggs to Dr. Brewer. That gentleman, it is to be hoped, will hereafter find time to supply the defect of information on this part of the subject, to which very little attention has been paid.

The Golden-winged Warbler, *Sylvia chrysoptera*, which Nuttall thought was never seen in this State, is ascertained to be one of our visiters by Mr. James Eliot Cabot, who shot one of them in Cambridge.

The Nashville Warbler, *Sylvia rubricapilla*, is placed among our birds by Mr. Samuel Cabot, Jr., who obtained a specimen in Brookline. Audubon states that three or four, found in Louisiana and Kentucky, are all that he ever saw.

Swainson's Warbler, *Sylvia Swainsonii*, has been found by Mr. Cabot, within the limits of our State.

The Orange-colored Warbler, *Sylvia celata*, probably passes through the State on its way to the

eastern parts of Maine and the British Provinces, where it builds and rears its young; but it is not ascertained that any one has yet been discovered here.

Roscoe's Yellow-throat, *Sylvia Roscoe*, so much resembles the Maryland Yellow-throat, that Audubon, the discoverer, at first thought it only an accidental variety of that species. Nuttall says that it is seen in Massachusetts at the close of summer, and his impression is that it breeds here.

Before leaving the subject of warblers, I may be permitted to say how much we are under obligation to them; not as a plea in their behalf, since their diminutive size protects them. They are too small to be valued for food, or to afford the requisite degree of excitement to the sportsman. We are told by travellers, that the scenery of Spain seems lifeless and heavy, from the want of singing birds; ours, on the contrary, is animated with the voices and lighted up with the plumage of these little birds, most of which are as beautiful in colors as they are sweet in their song. From a circumstance mentioned by Audubon, one can easily estimate the importance of their services. He says that he found more than fifty insects in the crops of only two of them. Millions remain in the United States throughout the summer, and those which pass through the country, arrive precisely at the season when insects are springing into life and action; so that the visit of two or three weeks, which they make with us at that time, is as valuable to us as ten times the same amount of labor at any other part of the year.

The Ruby-crowned Wren, *Regulus calendulus*, is a beautiful little bird, often seen here late in the autumn, on its return from the northern regions. How far they go, and what are their habits at that season, no one has yet been able to inform us. Audubon had no doubt of its breeding in Labrador, but he did not succeed in finding its nest, neither has it been found by any of the arctic expeditions. Wilson met with them in Pennsylvania, in the summer, but they are not seen in Massachusetts till the autumn, when they associate with the titmouse, and move round in busy silence, wholly intent on the work of gathering food. At the north, their song is equal to that of the canary, in richness, variety and power. They are not uncommon in the western parts of the State.

The Fiery-crowned Wren, *Regulus tricolor*, has been obtained by Dr. Brewer, in the vicinity of Boston. It rears its young in Labrador, and is seen here on its return in October, when it collects its food, consisting of the larvæ and eggs of insects, without regarding the presence of any observer. It is said, that on striking the branch on which they are perched, these little birds will fall dead, as the Canada jays are often killed by their enemies, the hunters.

The House-Wren, *Troglodytes aedon*, is a summer resident in the State. It is a spirited, restless, wayward little bird, which treats the human race with great familiarity. It seems to expect that

lodgings shall be provided for it; but if this is not done, it will build under the eaves of houses or in barns. Nothing in the vicinity of human dwellings troubles it but the appearance of a cat, which throws it into a vociferous passion, which does not subside till the hated enemy retires. It remains with us from April to September, and adds much to the attractions of summer by its animated and often brilliant song, which, like that of the vireos, is heard in the heat of day, when other birds are at rest. It has many quarrels with other birds, and, small as it is, maintains its rights, and perhaps something more. In the war of words it has no equal; and some other birds seem as if they gave up to it, not from fear or conscience, but merely to escape its perpetual and abusive din.

The nest of the house-wren is formed with an outwork of twigs interlaced with care and skill. Behind this barricade is the true nest, made with grass and lined with feathers. The eggs, from six to nine, are of flesh color, inclining to red. The young, soon after they are fledged, seem to have all the playful activity of the older birds. It is rather singular, that these birds should bear the name of *Troglodytes*, signifying dwellers in caves, when they are so remarkable for constructiveness, that the male often amuses himself, while the female is sitting, with building another nest, which he has no thought of ever using.

The Fresh-water Marsh Wren, *Troglodytes brevirostris*, is a summer visiter, not uncommon, but

not known as a distinct species, till it was described by the unwearied Nuttall. It should have borne his name; but that will be so identified with the science as to need no such commemoration. It is known to boys by its song, *chip-a-day-day*, which is so often heard in the meadows. He describes its nest as made of sedge, bent from the top of a grassy tuft, and forming a spherical arbor, with an entrance on the side. He remarks, that in a nest containing seven eggs, three of them were larger than the rest, and were fresh, while the other four were far advanced toward hatching. From this he inferred that two different birds had laid in the same nest. There seems no great need of crowding thus, since the male employs himself in building nests, a great part of which are neither wanted nor used. This species, which has been confounded with the following, remains with us from May till September.

The Salt-water Marsh Wren, *Troglodytes palustris*, is found on marshes and the borders of rivers near the sea, but is not so common as the preceding. This bird is quick and active in its motions, and in its song resembles the last described. The nest is formed of wet rushes twisted into each other, and filled in with mud, in the shape of a cocoa-nut, with an opening in the side. The eggs are from six to eight, of a color approaching to mahogany. Nuttall thought that this bird hardly ever came nearer than New York; but Dr. Storer has found its nest and eggs at Barnstable, in our State.

The Winter Wren, *Troglodytes hiemalis*, is inserted in the list of our birds, on the authority of Audubon. It abounds in Maine, in summer, but in this State it must be always rare.

The Wood Wren, *Troglodytes Americana*, is a new species, discovered by the same distinguished ornithologist, who says that it is found in Massachusetts, though he cannot speak with certainty of its summer haunts, nor of the extent of its migrations.

The Blue Bird, *Sialia Wilsonii*, is a delightful messenger of spring, whose early appearance makes us ask, "Hast thou a star to guide thy path?" since he comes before the fetters of Orion are unbound, or the sweet influences of Pleiades have begun to fall. He is said to resemble the English redbreast so much in form and habits, as well as the tinge on his breast, that he was called the blue-robin, by the first settlers of this country. The first indication of spring brings the blue-bird, and his sweet, but rather timid and tremulous note seems expressive of uncertainty, whether the season will permit him to remain. He is often driven back by a relapse, as happened in January of the last year, when he came on one or two fine mornings, but was soon compelled to retreat. Every body loves the blue-bird, and some make it a practice to encourage him by providing lodgings for him, which he readily occupies, and where he manifests a freedom from uneasiness, which he cannot feel where his nest is more exposed. It certainly is wise to encourage him; for almost all his time

is spent in catching beetles, grasshoppers, spiders, and grubs, for which we have seen him descending in fields, and open grounds. The wire-worm is another of their luxuries, which are all of a kind that man can easily spare. When they eat berries, it is not those of the garden, but the sumach and wild cherry.

Unless the hospitality of man provides the blue-bird with lodgings, he resorts to hollow trees, where he shelters himself from the elements, and there, or in a house made for the purpose, the pair construct their nest; it is a short and easy process, for nothing is required but a lining of hay and feathers. The eggs are from four to six, of a pale blue. Two broods, and sometimes more, are raised in the season, and, while the female sits on the second set of eggs, the male takes charge of the young. In defence of his family he is very courageous; he has been known to attack a hen with chickens, who came too near his abode, and put her to a hasty flight.

During winter, the blue-birds abound in the southern states, and particularly in the Floridas, which, however, they leave as early as possible. But they do not go very far to the north. In Maine they are not common, and in Labrador not one was seen by Audubon's party. Towards autumn, their song is no longer heard, except one complaining note, in which they seem to lament the necessity of leaving their home. To the last moment they linger, and it is not till the trumpet of the storm indicates that the hosts of winter are upon them, that they will consent to bid us farewell.

The Brown Lark, *Anthus spinoletta*, is one of those birds which arrive from the north, without much to indicate whence they came or whither they are going. They are common in fields in the country, and are said to be equally so along the borders of rivers and the Atlantic shores. They fly in loose scattered flocks, giving out a feeble note, run rapidly on the ground, and when they take wing, generally move high and far before they alight. Some of them spend the winter in Pennsylvania, and they abound at that season in the southern states. Those which pass through our State in the autumn, are all young; nothing is known of the old birds, though Labrador is one of the places where they rear their young.

GRANIVOROUS, OR PASSERINE BIRDS.

The Shore Lark, *Alauda alpestris*, is a pretty bird, which comes to us from the north at the approach of winter, and, if the season closes early, is seen here in October, on its way to the middle states. If the season is mild, they sometimes remain here, and those which proceed, seldom go farther south than Maryland. While here, they fly high, in loose scattered flocks, and have a single note, resembling that of the sky-lark of England. Their food seems to consist of seeds and the larvæ of insects, which they find on the ground, or on fences where they sometimes alight, though they never perch on a

tree. They pass the night on the earth, in small parties, near tufts of dry grass. When they are alarmed, all take wing, and, after flying round for a short time, return to the same place again.

Audubon describes the nest of this bird, which he found in the moss at Labrador, and tells us that the song of the male at that season is very sweet.

The Snow Bunting, *Emberiza nivalis.* As soon as winter reigns, "sole monarch of the inverted year," these birds come, riding on the snow-storms, and are seen in parties sweeping over the desolate country. Sometimes they alight on trees, sometimes on fences, and are even familiar enough to take their station at times upon the roofs of houses. Till they are persecuted for the sake of their flesh, they are disposed to be on the best possible terms with man; but as they are considered the harbingers of very severe weather, they meet but a cold welcome. Their flight is swift, and well sustained; they seem to enjoy the fierce and angry winds; but careless of cold as they are, and apparently well protected, they are sometimes so chilled as to be unable to escape from those who pursue them. In Labrador, where they are called *White Birds*, they feed on seeds and insects, but while here, they must depend for their subsistence almost entirely on seeds. For this purpose they often alight on trees, but are seldom seen in the woods. Like the larks, they live much on the ground.

The summer dress of the snow bunting is pure white and black; but they are not seen with this

plumage here. Their appearance here is various; but generally they are white and rusty brown. In the summer they are said to sing sweetly, but their strains are wasted on the desert air. Some have been known to rear their young in the White Mountains of New Hampshire.

The Black-throated Bunting, *Emberiza Americana*, is found in high meadows near the salt water marshes, from the middle of May till the last of August, when it returns to the south, and spends the winter in countries beyond the boundaries of the Union. Early in summer, they feed on caterpillars and insects, and are among the destroyers of the pernicious canker-worm. Their note is constantly heard from every level field of grass or grain; they often perch on some low tree, and there for a long time breathe out their simple and unpretending song. At these times, they may be approached without taking wing; they seem to be friendly to man, to other birds, and to each other. In August they become silent, and not long after, leave us for the south, going beyond the extremity of the Union.

The Scarlet Tanager, *Tanagra rubra,* is a splendid summer resident in this State. He is retired in his habits, but not distrustful, and as he often comes into enclosures, he is well known by his rich and elegant plumage, and the sweet variety of his song. His common note is a *chip, chirr,* repeated at short intervals, in such a tone that it is very difficult for the hearer to determine whence the

sound proceeds. At other times he has a song, which bears some resemblance to that of the red-eye, excepting that it is more continuous and unbroken. Were it not that the eye is charmed by the beauty of his scarlet and glossy black, as it glows against the foliage in the sun, his musical powers would be more highly estimated. There is nothing to be set off against these recommendations. He cannot be accused of any kind of depredation. His food consists of insects, and of these, he is particularly fond of the wasp, one of our greatest fruit destroyers. Sometimes he feeds on berries and seeds, but they are not taken from the garden.

These birds arrive toward the last of May, and immediately begin to build, generally on the large bow of an oak, but sometimes on an orchard tree. The nest is loosely put together. The eggs are three or four, bluish, spotted with purple and brown. They are very affectionate toward their young. If any one approaches the nest, the female is in great distress. As soon as they require food, the male supplies it, and so anxious is he for their welfare, that he has been known to follow one of them for half a mile, and as he could not release it, to feed it through the wires of its cage, and roost in the same tree by night. At the beginning of August, the male assumes the green and yellow dress of the female, and in company with their young, they set off for their winter quarters.

The Indigo Bird, *Tringilla cyanea*, is a spirited and beautiful summer resident, well known in every

garden, where, from the tops of trees, from roofs, and chimneys and lightning rods, we hear his sweet lisping song, which at first is exceedingly pleasant, but at length wearies the ear by its perpetual repetition throughout the summer day. The rich blue which gives this bird its name, belongs exclusively to the male; the female and the young wear plain flaxen dresses. The young males of the first year have a little blue in their buff-colored plumage; this increases as the bird grows, and it is not till the third year that it acquires the azure with green reflections, which makes the mature bird so ornamental to the village scenery. It is sometimes difficult to determine whether it is blue or green, so rapidly does it change in different lights, as it glances in the sun.

The nest of the indigo-bird is usually in a low bush, sometimes in vines; in the former case, it is suspended between two twigs. The outside is composed of coarse grass and withered leaves; the lining is of grass and hair. The eggs are greenish white and unspotted, according to Nuttall; Wilson says, blue, with a purple blotch at the larger end; Audubon says, "with a blotch or two of purple." As to these singular discrepancies, I have already remarked, that this part of the subject is greatly in want of attention.

The White-crowned Sparrow, *Fringilla leucophrys*, is one of the finest of this family of birds. It is seen here but very rarely, on its way to the north in the spring. Audubon describes its nest, which he found in Labrador, and speaks of its notes as very plaintive and sweet.

The White-throated Sparrow, *Fringilla Pennsylvanica*, is much more abundant than the last. It attracts attention by its size and beauty, and still more by its song, which, though unvaried in tone, and slowly and solemnly uttered, is nevertheless, as heard in May mornings, one of the most delightful melodies of spring. It is not known in what manner it performs its migrations; the first news we have of its coming is from its own plaintive note, heard from the borders of the fields. The sparrows move in companies, and frequent hedges and thickets, where they run upon the ground and scratch for seeds. On any alarm, they plunge into the deepest shade; but when free from uneasiness, they ascend to the highest branches and open their plaintive and emphatic strain. In the warmer days, they resort more to the borders of woods, but the thicket is always their favorite home. They appear to have no great dread of the presence of man; but the hawks are very destructive to them, and the sparrows seem aware of their danger, and desirous to keep as much as possible out of their sight and reach. In New Hampshire their note is interpreted into a warning, that the time to sow wheat is come. Their stay does not exceed two weeks; and, when they leave us, they go to the far north. Dr. Richardson found their nests on the banks of the Great Bear Lake.

The Bay-winged Finch, *Fringilla graminea*, is a bird, plain in appearance, but pleasant and unpretending in its song, which is constantly heard in

fields and dry pastures; they run on the ground, in the manner of larks, in search of the seeds and insects which compose their food. To the grass-bird, as it is called, we are indebted for some of the sweetest music of our spring; their song begins very early in the morning, and continues after sunset, but they are generally silent in the heat of the day. They come early in April, and the best of their song is heard till the summer opens, when their note becomes more monotonous for the season. Some of them spend the winter in Pennsylvania, but most of them go farther to the south to escape the cold.

The nest is built in the grass, partly sunk in the ground. It is formed of leaves and dry grass, well lined with horse-hair. The eggs, four or five in number, are flesh-colored white, with spots of reddish brown. When the female is disturbed, she pretends lameness, and practises various arts to withdraw attention from her young.

The AMBIGUOUS SPARROW, *Fringilla ambigua*, of which a single specimen was obtained by Nuttall, was, he says, a young bird, and may undergo some changes in its markings. Audubon suggests that it may turn out to be the white-crowned sparrow in its winter plumage. The size is different; but the point must be left for future observations to decide.

The SONG SPARROW, *Fringilla melodia*, is a well known bird, very common in all parts of New England, and richly deserves its name. It comes in company with the blue-bird, and though it has no pretension to the beauty of its friend, exceeds it in

the sweetness of its song. This cheerful and pleasant note is heard, in the near vicinity of human dwellings, from trees, stakes, and fences, and if it were not one of the most familiar sounds of summer, would be universally admired. This bird is common in Louisiana, in winter, and comes to the north before the snows have left the ground. From the time of its arrival, we hear its unwearied note at all hours of the day, growing louder and more animated as the spring advances. It frequents fields and meadows, which afford the insects which it is active in destroying. It also enjoys the vicinity of water, in which it is fond of bathing. It has been known to swim to some distance when disabled from flying.

The song-sparrows build sometimes in a bush, and sometimes on the ground. They have been known to resort to a hollow tree. The nest is usually made of dried grass, with a lining of hair. The eggs are greenish white, speckled or spotted with umber, chiefly toward the larger end. Audubon inquires, why it is, that they never use the same nest twice, when they raise two or three broods in a season, and always keep it so scrupulously clean? The obvious reply is, that a bird so neat and industrious, is the very one most likely to take the trouble of building a new nest; while a bird more slovenly and indolent, would re-occupy its old abode, from the same aversion to labor which induced it to leave it neglected.

The Savannah Sparrow, *Fringilla Savanna,* is rare, compared with the preceding, and is most com-

mon near the sea. Its song is animated, though far inferior to that of the song-sparrow. Though it is very hardy, it proceeds to the south in winter and returns in April, when it resorts to fields and open plains. Audubon says, that it breeds in all places, from Maryland to Labrador. If so, the nest probably can be found here, though it may be easily mistaken for that of the species last described.

The Snow-bird, *Fringilla hiemalis,* commonly called the blue snow-bird, to distinguish it from the snow-bunting, a bird much less common than this, comes to us just in advance of the wintry desolation, an infallible sign that the dreary season is at hand; dreary to us, it would be proper to say; for this little traveller, though it retreats before it, evidently has no fear of its cold and snow. It is almost always seen here in company with the tree-sparrows. After doing all they can to pick up a subsistence from the frozen ground, they come round our houses to gather crumbs, or any morsels of provision that may have been cast out from the door; and if a handful of meal is thrown to them, they receive it with great delight. After remaining with us as long as possible, in the heart of the winter, they are compelled to remove; but with the first glimpse of spring they reappear, resorting to orchards or to the edges of the wood, and roosting in hay-stacks, when the nights are severely cold. They are only summer residents in the fur countries, and never abound there. Wilson tells us that they sometimes breed in the Alleghany mountains.

The Yellow-shouldered Sparrow, *Fringilla savannarum*, comes from Mexico and the West-India islands, where it passes the winter. It pays us a passing visit, when it attracts some attention by its song; but it soon hurries on to some other breeding-place. While here, it prefers the neighborhood of the sea, where it explores newly ploughed fields in search of insects and seeds. It never retires to the woods.

The Tree-Sparrow, *Fringilla Canadensis*, arrives from the north at the approach of winter, and remains here during most of that season. It is called the snow-bird, by many, and is often seen in company with the blue snow-bird. When the deep snows cut off their resources for food, they come together into our yards and under our windows, and generally succeed in obtaining some small charity from man. Early in spring they prepare for their return, but delay it on various pretexts; till, a day or two before their departure, they recover their voices, and sing sweetly from the trees of the orchard. Audubon did not find them at Labrador; but he met with their nests in Nova Scotia, and his impression is, that they breed in the northern parts of Maine. The tree-sparrows are easily distinguished from others, by the spot in the centre of the breast.

The Chipping Sparrow, *Fringilla socialis*, is our most common bird, and so well known as hardly to need a description. It is found alike in the city

and the village, in the field and the garden, in the forest and at the house-door. After passing the winter in the southern states, it returns early in the spring. It has no pretension to song, though, when it first returns, it keeps a continuous jingling sound, unlike the chipping note to which it owes its name. At the close of summer, the old and young birds search for seeds in the fields in large flocks, collected in preparation for their flight. The first snow fall is their signal for disappearing.

This little sparrow, in order to escape from worse enemies, places its nest under the care of man. It builds in the sides of walks, the corners of piazzas, or some spôt equally open to observation; and so strong is it confidence, that, if the nest is torn down, it regards it as an accident, and builds in the same place again. It adopts these sheltered situations, with a view, no doubt, to escape from cuckoos, which would steal all its eggs if they were exposed in the woods.

The Field Sparrow, *Fringilla pusilla*, resembles the species last described, but is brighter in color and has a longer tail. With us, after the first of April, it is found in open fields and pastures, where it lives on insects and seeds. The song is peculiar and likely to attract attention, not so much from its sweetness, as its canary-like trill. Its nest is built on the ground, after the fashion of most other sparrows, and made of hay, with a lining of fine grass or horse-hair. The eggs are so thickly sprinkled with rusty brown as to appear almost

wholly of that color. It usually raises two broods in a season.

The Swamp Sparrow, *Fringilla palustris*, is rather common, after the middle of April, in the swamps and marshes, from which it takes its name. Wilson speaks of it as destitute of song. This is a mistake; its strain, though not equal to that of some others of the tribe, is lively and pleasant. It is distinguished by its passion for the vicinity of water, where it continually forces through brush and thickets, till its tail is worn almost away.

The nest of the swamp sparrow is made on the ground in swamps, with the coarse grass which grows there. The eggs are four or five, of a dull white, spotted with reddish brown. The old birds express great anxiety for their young, but apparently without much reason, for they have a wonderful alacrity at hiding in the grassy places where they dwell.

The Sharp-tailed Finch, *Fringilla caudacuta*, is added, at the suggestion of Dr. Brewer, on the authority of Nuttall.

The Seaside Finch, *Fringilla maritima*, is found along the borders of the ocean, and in the sea islands; it visits the interior only when driven by easterly storms. It runs in search of marine insects and small shell-fish, like a sandpiper, on the edge of the strand. Like the swamp sparrow, it has feet and legs of great strength, and suited to its way of life. These finches build on those parts of the

marshes which are above the flow of the tides. The nest is of grass; the eggs are dusky white, speckled with brown.

The American Goldfinch, *Fringilla tristis*, well known by its beautiful yellow plumage and jet black wings, can hardly be said to return in the spring, since many of them do not leave us in winter, though, as they roam about in their dusky dresses, with their complaining note, there is little about them to remind us of the gay musicians of the spring. They are often seen when the ground is covered, gathering a living from the tall stalks of weeds that rise above the snow. For some time they will be missing, and then they rove about without any fixed direction, and apparently never much troubled by the want of food. When the warm gales begin to blow, the males resume their colored dress, the females among birds not being permitted to share that fatal gift of beauty, that might attract attention to their nest. The social habits of these pretty birds give double interest to their song, since all join in harmony, sometimes plaintive and low, then gay and loud, as they enjoy the sunshine together. They are fond of bathing and pluming themselves in company; in fact, they always associate together on the most friendly terms. In our gardens they collect the seeds of lettuce, but thistle down is their favorite food, and they cannot be justly charged with doing any injury whatever.

They make use of thistle down, with other soft and delicate substances, to build their nests. They

are placed on trees or tall bushes, and constructed externally of dry leaves and other rubbish, with a lining of fine grass, hair or down. Audubon speaks of its nest as covered with lichens, glued on with saliva; the nests here have no such disguise. He also speaks of the eggs, which are from four to six in number, as white, tinged with bluish, and speckled with reddish brown. Here, the eggs are white.

A year or two since, I saw one, in a large flock of goldfinches, which was distinguished from the rest by plumage partly flaxen and partly white. At a little distance it appeared like a snow white bird.

The Pine Finch, *Fringilla pinus*, comes occasionally from the north in winter, and sometimes proceeds as far as the southern extremity of the Union; but the first approach of spring drives them back to their northern home. In the state of Maine they abound in the cold season, and are sometimes, though not regularly, seen here. Their flight resembles that of the goldfinch, with rising and falling inflections, and their note is said to be similar and equally sweet. Where they rear their young has not yet been discovered.

The Lesser Redpole, *Fringilla linaria*, is an occasional visiter in winter. Flocks have been seen as far south as Philadelphia; but they come at uncertain, and generally distant intervals, and very little is known concerning either their habits or their song.

The Fox-colored Sparrow, *Fringilla iliaca*, is, perhaps, the finest of this family of birds. It is large and handsome; generally larger than Nuttall's measurement, which is but six inches. When the evening sun falls on its cinnamon plumage, its appearance is beautiful. It passes through Massachusetts on its way to the south, soon after the fall of the leaf, and returns early in the spring; it is then seen in gardens, scratching the ground, in search of seeds and insects, making no sound except a low call occasionally to its companions. It waits till the weather grows mild enough for its journey, and as soon as it determines to go, perches on the high branches of trees and sings an air, easy, flowing, clear and incomparably sweet. They rear their young in the British Provinces and other northern regions.

The Ground Robin, *Fringilla erythropthalma*, is an exceedingly common bird, found on the borders of forests and woodland roads, where it scratches among the dry leaves for worms and insects, so entirely absorbed in its employment that any one can approach within a few feet of it without its taking any alarm. While thus engaged, it often utters the loud call from which it is named the *pee-wink*, and sometimes the *tow-wee* bunting. But at times, it sings with much more pretension, and, perched on the high branch of an oak, warbles a loud, clear, and very agreeable song. It leaves us for the south in October, and returns in April, the males coming first, as if to make the necessary preparations. In autumn

the case is reversed, and the females lead in the migration. There is sometimes a fortnight between.

Wilson praises the address with which the ground-robin conceals the place of its nest; but it seems to depend almost entirely on its resemblance to the ground about it, to secure it from unfriendly observers. It is sunk a little below the surface, sometimes under the shelter of a small bush, and is made of such materials as come most readily to hand, such as strips of bark and withered grass, with a lining either of fine grass or the fallen leaves of a pine. The eggs are four or five, of a soft white, spotted with reddish brown. The old birds are very anxious for the safety of their young, and practise the usual arts to draw the intruder from their nest.

The Cardinal Grosbeak, *Fringilla cardinalis*, cannot be considered as one of our birds, though its occasional visits require its insertion in our list. It is seen, but only at irregular intervals, in the villages on Connecticut river. Wherever the celebrated red-bird appears, it attracts attention, not only by its splendid plumage, but its bold and beautiful song.

The Rose-breasted Grosbeak, *Fringilla Ludoviciana*, supplies the place of the cardinal, rivalling that fine bird in beauty and surpassing it in song. It is difficult to determine at what time its visits to us are paid. It is seen here sometimes before the snow has left the ground, and is met with at in-

tervening periods till midsummer; as this is the time for incubation, it must rear its young in some places not distant, certainly, if not within our bounds. At the latter part of the summer, our gardens are frequented by the young in great numbers, and bitter complaints are made, with or without reason, of their depredations on the peas. Near the sea-shore they are much less common than in the interior; in some years, it is rare in all parts of the State.

This bird migrates to the south early in autumn, and on its way, is seen in many parts of the Union; the nest is found in New York and Pennsylvania, and regions farther north, but in Labrador, Audubon did not find a single bird. The note of this grosbeak is striking, particularly when heard, as it often may be, in the silence of the night. It may be seen standing, with its wings lifted, as if to display the crimson lining, before it begins its song. The young are three years in obtaining their plumage. Till then, they resemble the female, except that the red begins early to show its traces on the breast. The descriptions usually given of the bird, do not agree with specimens that are often found, with stripes of white on the head and over the eye. The tail, instead of being forked, is very slightly emarginate, if at all. The food of this grosbeak consists of insects, berries and seeds.

The Blue Grosbeak, *Fringilla cærulea*, is not at present known as one of our birds; but a gentleman, whose authority is unquestionable, is confident that

he has seen more than one in this State. It will, without much doubt, be numbered with our occasional visiters, by future observers.

The Purple Finch, *Fringilla purpurea*, is not an uncommon bird in this and more northern regions. Some of them pass the breeding season here; the greater number keep on toward the British provinces, where they spend the summer, and return to the south about the time when the leaves fall. At that season their food consists of insects and berries; when these cannot be had, they eat the seeds and sometimes the buds of trees.

The crimson linnet, as it is sometimes called, has a rich and varied warble, clear as the softest tones of a flute. It sings not easily and unconsciously, like the sweet vireo, which it resembles, but more with the air of a performer, and as if it knew that some one was standing still to listen. It runs through various changes, with great rapidity and skill, and seems to challenge all the feathered tribes, to rival its admirable song.

General Dearborn was the first to discover the nest of this bird in Massachusetts. It was built on the low branch of a balsam fir, with the outside covered with lichens. Mr. Cabot and Dr. Brewer have also found them; but the number of those that remain with us at that season, must be small.

The Pine Grosbeak, *Pyrrhula enucleator*, is an inhabitant of cold regions, and comes to us at irregular intervals, either in winter or when that season is nigh. Professor Emmons tells me that they were

common near Williamstown, in the autumn of 1836, which was unusually gloomy and cold. They are splendid birds, but so great strangers here, that they hardly merit a description.

The Common Crossbill, *Loxia curvirostra*, belongs to northern regions, and comes to us during the winter, in search of food. It delights in the seeds of evergreens, and makes use of its singular bill to extract them, holding the cones in its claw, like the parrot, while it forces the seed vessels open. At the south it is in the habit of tearing apples to pieces, for the sake of extracting the seeds. Wilson says, that in deep snows, it is familiar at the cabin of the hunter; when disturbed, it flies only to the roof and soon descends to the ground, to feed as before. When better food is wanting, it sometimes relieves the sensation of hunger by swallowing bits of clay. When engaged in eating, it may be seen standing on one foot and feeding itself with the other. It sometimes employs its bill to aid itself in the act of climbing.

Audubon has not succeeded in finding the nest of this bird, but he has explained the difference of markings as connected with its particular age.

The White-winged Crossbill, *Loxia leucoptera*, visits us, like the former, in the winter season. It is more common perhaps than the other, but still is rare. It comes in large flocks, and then is not seen for several years. In form and habits it resembles the other; but is a much handsomer bird. It is known by its colors, black and crimson, and by the white bands upon the wings.

ZYGODACTYLI.

The Yellow-billed Cuckoo, *Coccyzus Americanus,* arrives from the south about the first of May, and is by no means an uncommon bird. It is often heard when it cannot be seen, uttering its loud, coarse notes, in rapid succession, from the depth of the woodland shade. There is a prevailing impression that the cuckoo's cry is the harbinger of rain, from which it has derived its popular name of rain-crow. This bird flies in silence, under the shadow of the foliage, as if it were conscious of the discreditable manner in which its living is obtained, and were not desirous to call the public attention to its proceedings; for when thus seen, it is passing from the nest of one small bird to another, to suck the new laid eggs. But this is not all its subsistence. It devours many insects; among others the large yellow cockchaffer, and thus does some good to man, to atone for its injuries to its own race.

The cuckoo seldom follows the example of its foreign namesake, which lays its eggs in the nests of other birds. In this country, that kind of knavery is almost confined to the cow-bird. It builds for itself a hasty and carelessly constructed nest. The eggs, from two to four in number, are bluish green. If they are disturbed, the female is apt to desert the nest; but if the young are hatched, it is so devoted and affectionate, that it will almost be taken in the hand, rather than abandon its charge. The young

are fed with the hairy caterpillars, that are found on apple trees; but it is well that they are not more numerous, since they might greatly diminish the numbers of other birds, whose services would be more important than theirs.

The Black-billed Cuckoo, *Coccyzus erythrophthalmus*, is often mistaken for the preceding, from which it differs in some of its habits, beside arriving later in the spring. It feeds on insects and birds' eggs, like the other, but extends its bill of fare to include the small shell-fish found in fresh waters and the small frogs from wet grounds. For this reason it is often found near the edge of water, or on branches bending downward to the stream. This species is less timid than the other; its note is equally unmusical.

These birds build their nests in the forest, resembling those of the former species, being little more than a flooring of twigs and moss, with a slight hollow in the centre to receive the eggs. These are from three to five, of the same color with the other, but rather smaller.

The Golden-winged Woodpecker, *Picus auratus*, is a very common bird in our gardens, known when flying at a distance, by the white on the lower part of the back, disclosed by the open wings; when nearly examined, it is admired for the beauty of its markings. It is driven from the northern states in winter by the excessive cold, but in April it is with us again, when its voice resembles a laugh, as if it

were rejoicing to be able to return. They are cheerful, animated birds, which do much to give life to our scenery in spring. Their flight is strong and well sustained; when passing from one tree to another, they move in a straight line, till they come near the spot where they mean to alight, when they raise themselves a few feet and cling to the bark of the tree by their claws and their tail, with a nod of the head and a note, from which they are generally called the 'Flicker.' They hop on the ground with ease, in search of food, which consists of insects and various kinds of fruit. In winter, they occasionally supply themselves from the farmer's corn. They are a good deal persecuted by black snakes, which steal their eggs and young; and also by hawks, from which they escape by darting into a hole in a tree, if any one is at hand, and if not, by alighting on a trunk, and moving round it faster than the enemy can follow.

These birds are sometimes shot, but their practice of eating ants and their larvæ gives a taste to their flesh. Sometimes they are persecuted as fruit stealers, but most unwisely, for all the woodpeckers are very efficient aids to the horticulturist. When they alight on a tree, they listen attentively, and the slightest movement of an insect under the bark does not escape them. They enlarge the hole by repeated blows of their powerful bill; then striking in their long, viscid tongues, with their horny tip, they seize the grub, and put a period to his mining.

They build in hollow places, found, or made for

the purpose, in trees; and such is the strength of their bill, that they have been known to make excavations a foot and a half deep, into the heart of the hardest wood. Their blows may be heard at a great distance, as loud as those of a hammer. The eggs, about six in number, and pure white, are deposited on bits of the wood. Soon after the young are hatched, they leave their den, and are fed on the branches of the tree till they are able to fly.

The PILEATED WOODPECKER, *Picus pileatus*, is a large and powerful bird, not uncommon in the woodlands of Massachusetts, but seldom found in the vicinity of large towns. It does not leave us in winter, like the preceding, but remains throughout the year in our wild forests; and almost every woodcutter can describe the rapid and angry manner in which he strips the bark from a hemlock or spruce, throwing it in long flakes around him. Should any one pursue him, he keeps far out of his reach, laughing, as one would think from his loud cackle, at his enemy's vain endeavors. He never, under any circumstances, relents from his natural wildness. If wounded, he makes fierce resistance to all attempts to seize him; and if overpowered and carried captive, spends all his time in trying to escape from his prison. This he can easily do, unless the materials are very hard and strong; and if he does not succeed, he can make an impression in an hour on the walls of his house of bondage, which the carpenter cannot repair in a day.

This bird excavates a gallery with its bill, for a

nest, in which it lays five or six white eggs. Sometimes it saves itself this labor, by making use of a hollow tree. The young remain for a considerable time with their parents, who feed them till their bills are grown hard enough to procure a subsistence for themselves. This is not the case at first; for two or three months, the bill is so soft that it can be bent with the fingers, and it takes twice that time to harden it for the rough uses to which it is to be applied. In the south, this bird is called the Log-cock; and the Black Woodcock, in the middle states.

The Red-headed Woodpecker, *Picus erythrocephalus*, is a very elegant bird, and perhaps the most common of this familiar race. When Wilson first landed in this country, long before he devoted himself to ornithology, as he was walking from Newcastle to Philadelphia, he shot one of these birds; its fine appearance and rich colors struck his imagination so much, that it had an influence in determining his mind to that pursuit for which he was afterwards renowned. After spending the winter in the south, this bird returns to us in May, after which it is very common in the interior, though somewhat rare in the eastern part of the State. It makes its home in the woods, but spends most of its time in gardens, particularly at the time when the best fruits are ripe. It helps itself with the utmost freedom, caring little for the rights or threats of the owner. Fruit like apples, too large to be eaten on the spot, it carries away, striking it with a jerk of the head, and flying off with the apple sticking on its bill.

There is no secrecy or shyness in its depredations; they are conducted with perfect good nature, and with a confidence, fully expressed in its manner, that the proprietor enjoys the appropriation as much as they do. But there is another side to the account, for they show great skill and industry in searching the trees for grubs, which would be infinitely more destructive to the tree, than the woodpecker to the fruit.

They make their holes in decaying trees, where the eggs, white, with reddish spots at the larger end, are deposited without the ceremony of a lining. The black snake is a great destroyer of the eggs and the young. They show considerable local attachment, and for years in succession, they resort to the same tree.

The Red-bellied Woodpecker, *Picus Carolinus*, is said to be unknown in the eastern part of the State. In the interior it is found, and Professor Emmons tells me that he has shot the bird in the season of incubation; others have taken them in the autumn. They are found through the whole extent of the United States; but instead of frequenting the gardens, they choose the solitude of the forests, preferring the hardy independence of the woodlands, to the dangers which threaten them in the vicinity of man. They have no objection to the first approaches of civilization, and come freely to the girdled trees wich surround the log hut of the borderer; sometimes they pay a visit to his cornfield, when animal food is wanting, and their loud,

barking cry, is one of the most familiar sounds he hears. They were doubtless common in Massachusetts, some years ago; but as they gradually withdraw before the settlements, they will disappear as the forests are cut down; a consummation, which is quite as near at hand, as the friend of civilization could desire.

The Yellow bellied Woodpecker, *Picus varius*, is found in summer, in most parts of the State, but is not familiarly known, because, like the former, it keeps itself within the shade of the forest, seldom suffering cither hunger or curiosity to bring it near human habitations. Its notes, which are loud and plaintive, differ from those of all others of its tribe; but the bird is so shy and suspicious that it is not easy to discover whence the sound proceeds. In its flight it seldom goes farther than from one tree to another, and is hardly ever seen upon the ground. Its food consists of grubs and beetles. In the summer, it varies its fare with berries and grapes, which it frequently hangs, head downwards, from the vine, to gather. When they migrate, they proceed by day in parties of half a dozen, and at night take shelter all together in some hole in a decaying tree. Sometimes on these occasions, they have sharp conflicts with the Little Owl, in which they generally prevail by perseverance and force of numbers.

This woodpecker bores its hole in a sound tree, the male and female laboring alternately; and such is the power of their bills, that an excavation is

sometimes made to the depth of two feet, at the end of which is the nest. The entrance is just large enough to admit the bird, but it grows larger, and becomes quite spacious at the farther end. The eggs, from four to six in number, and white with a slight blush, are laid on the fragments of wood. The young remain in the hole till they are fully fledged.

The Hairy Woodpecker, *Picus villosus*, is a pretty bird, which comes so familiarly near our houses, that every one has seen it, intent upon its labor, searching for grubs and insects, not only in trees, but in posts, rails, and all kinds of decaying wood. Its call is a shrill whistle, and it makes a complaining sound as it explores the bark of the trees. It is either very tame, or so absorbed in its employment as not to regard the presence of an observer. It builds in the branch of a tree; sometimes taking one which is already hollow, sometimes scooping out an opening, which it does by beating off fragments with its bill, and scraping them out with its feet. The eggs, like those of others of the race, are white. The female is known by its wanting the red cockade on the back of the head.

The Downy Woodpecker, *Picus pubescens*, a small and very common species, is almost exactly like the former in every thing but size. It is often called the sap-sucker, from its practice of making perforations in circles on the bark of trees. The popular notion was, that this is done in order to extract the juices of the tree; but it is now well

understood that the bird is in search of insects, and that, so far from injuring the tree, its proceeding is highly beneficial. It is amusing to observe the tenacious industry with which this little bird keeps on in its labor, never leaving a spot till it has been thoroughly explored. There could not be a more signal instance of the manner in which ignorance confounds friends and foes, than the case of this poor bird, which, notwithstanding all its services, is thus defamed and persecuted. In summer it is found in the garden and the forest; in the winter, it may be seen from the window, on the wood-pile or some old fruit tree, which it relieves from many destroyers. It is perfectly happy under all circumstances, and seems to look at mankind, not with disgust and wonder at their folly, but with cheerful confidence that they will do it justice at last.

The nest is made like that of the preceding species, either in sound or hollow branches. The eggs, commonly six in number, are white. The extensile part of the tongue of this woodpecker, as well as of the two last described, is cylindrical, while the extremity is linear, flat above, convex below, with the tip pointed and the edges serrated backward; so that a grub, once impaled upon it, cannot easily be withdrawn.

The THREE-TOED WOODPECKER, *Picus tridactylus*, is found in Massachusetts, but much more abundantly in Maine, and those northern regions in which it resides. Dr. Brewer informs me, that a woodpecker, answering to the description of this,

was shot in Templeton, and that it breeds as near the border as Keene in New Hampshire. It is distinguished by its yellow crown, and that peculiar formation of the feet from which it derives its name. In its voice and habits, it most resembles the yellow-bellied; its breeding habits are like those of all the rest; its motions, like those of the red-cockaded, are petulant and restless, passing from one tree to another, or to different parts of the same tree, without taking time to examine any single spot. In the middle of the day, it is silent, and goes to some solitary place to rest. It is sometimes seen chasing insects in the air, but never hurts them on the ground. Its flight is swift, gliding and undulatory; at every gliding, it gives out a loud, shrill note. These birds are more common in the northern states, in winter, than at any other time; because they are then driven from their homes by the severity of the cold.

SLENDER BILLED BIRDS.

The White-breasted Nuthatch, *Sitta Carolinensis* is seen in autumn and winter, not because it migrates to us at that season, but because the supplies of food in the forest fail, and it resorts to fields, gardens, and the neighborhood of houses, in search of insects, such as ants and spiders. At a distance, it is easily mistaken for the downy woodpecker, though more lively in its motions. It moves side-

ways or head downwards, with great rapidity, stopping every now and then to cast an inquiring look at the observer. Its bill is strong and sharp, and when it would open an acorn or chestnut, it holds it in a crevice, and splits it with strokes of its bill. Its tongue is capable of extension like the woodpecker's, so that it has great advantages for procuring a subsistence ; but, if it were less favored, it might contrive to live, since it is sometimes seen hopping among the poultry on the ground.

These birds chisel out a perforation in a decaying tree, in which to deposit the eggs. These are five, dusky white, spotted with brown at the larger end. The young are fed and taught to fly with affectionate care. They are fond of roosting in their own nest, and are believed to return to it year after year. They are easily known by their cry, *quank*, two or three times repeated, as they run over a tree.

The Red-bellied Nuthatch, *Sitta Canadensis*, is more common among us than the other. It is not found farther south than Maryland, and becomes more common as we proceed toward Maine, where many of them are hardy enough to encounter the severest winters. It is a very active and industrious bird, always running over the branches of trees, searching with sharp eyes, sometimes rapping with its bill, and occasionally striking off a bit of moss or bark, to dislodge the grub below ; the only time it has for resting is at night, when, like others of the tribe, it holds by its feet to the bark and sleeps,

head downwards. It seems almost indifferent to the presence of man, unless he comes near it with obviously bad intentions. When it spends the winter here, it often comes near our dwellings in search of food. Its flight, when seen here, seldom extends farther than from one tree to another; but it must have great power to sustain itself on the wing, since on one of his homeward voyages, Audubon saw one come on board his vessel at the distance of three hundred miles from the shore; it alighted on the rigging, and began to search for food, but it had fasted too long, and in the course of the night it died.

This species is partial to pine forests, where it feeds on the seeds of the trees. Its nest is made in dead stumps, not high above the ground. We have at present no account of its breeding within the limits of our State.

The Black and White Creeper, *Certhia varia*, comes from the south in April, and is seen running nimbly round the trunks and large branches of trees, in search of insects, particularly ants and their larvæ, which are its favorite food. It is an unsuspicious bird, always too much taken up with its own affairs to pay much regard to an observer. It moves by short successive hops, with great rapidity, and in all directions with equal facility, with the head either up or down. It has but a very short flight, from one tree to another. Its notes are a series of *tweats*, rapidly pronounced, the last greatly prolonged.

Audubon says that at the south they breed in

holes in trees, but Nuttall found a nest in Roxbury, on the ground, protected by a shelving rock, and composed of coarse strips of the inner bark of the hemlock, which overshaded the spot. The lining was a thin layer of hair. It contained four young birds, about a week old, which the parents fed in his presence without fear. The eggs are white, marked with brownish red spots at the larger end.

The Brown Creeper, *Certhia familiaris*, makes its appearance at the approach of winter, not coming from other regions, but only from the forest, where it passes the milder season. Its bill is not powerful, but it has the advantage of a rigid tail, on which it rests while examining the bark of trees. Insects are its chief dependence, though it sometimes eats the seeds of the pine. With us it is not a common bird, nor is it known to breed in our State.

The Humming Bird, *Trochilus colubris*, is a beautiful little visiter, that generally makes its appearance with the earliest blossoms; and almost always in considerable numbers, though sometimes cold and wet seasons destroy many of the young. Of man it is very fearless, being often seen on flowering vines that climb over windows, and sometimes taking courage to enter apartments in which flowers are to be found. Its bill is long, and the tongue capable of extension. The bill is inserted into the urns of flowers, and then, darting out its glutinous tongue, it draws forth the insect from its fragrant home. After feeding, the bird settles on a bough and dresses

its feathers, without caring who observes its motions. It is a mistake to suppose that the honey of flowers is its principal support; it is rather its luxury than its means of subsistence; without a supply of insects, it will perish, as those have found who have endeavored to keep it on honey and sugar. This delicate little bird is easily reconciled to confinement, but it is so very sensitive to cold, that a northern winter will destroy it, however carefully it is guarded.

The nest of the humming bird is very ingeniously constructed. It is generally placed on the large horizontal branch of an apple tree, and covered with moss so as to resemble the place where a limb has been taken off and a circle of bark has risen round the spot. As the female is green, birds of prey might easily pass over it, without discovering the nest below. Their nests are sometimes built in small trees and shrubs. I have seen one on the drooping limb of a peach tree, not more than three feet from the ground, and this was carefully covered with moss, though there was none upon the tree. If any one goes up to the nest, the parent flies up to him as an intimation that he is doing wrong, then alights almost within the reach of his arm, and watches his motions with composed attention. The parents feed their young with affectionate care, till they are able to fly, and for about a week after. The young do not come to their full plumage till the following spring.

HALCYONS.

The Belted Kingfisher, *Alcedo alcyon*, is found in the neighborhood of fresh waters over all the United States. He may generally be seen sitting on some post or dead branch, near a solitary mill-dam, quietly watching his prey in the element below. If fish do not come near him, he sweeps along the course of the stream with rapid flight, and occasionally hovers over the water, as if watching something beneath. Having made sure of his aim, he darts down, and seldom rises without his prey. If scared from his retreat, he flies off with a grating sound of displeasure, resembling the noise of a watchman's rattle. When the northern rivers are frozen, the kingfisher resorts to the sea, where it may occasionally be seen fishing as in fresh water. The nest of this bird, it is well known, is made in an excavation, scooped in the side of a bank overhanging a stream or mill pond. It extends to several feet in length, with a larger chamber at the end. The eggs, about six in number, white, are deposited on some twigs, grass and feathers.

SWALLOW TRIBE.

The Purple Martin, *Hirundo purpurea*, is more intimate with man than any other native bird. So great a favorite is he, that lodgings are provided for

him, by the northern farmer, by the southern slave, and even by the Indian, who puts up a calabash for him at his cabin door; not wholly from benevolence, but because the martin pays rent, by keeping insects from the deer skins and venison, exposed in the air to dry.

The martin spends the winter in the south, and reappears in Louisiana in February, moving on deliberately in immense flocks, which divide into smaller parties as they proceed. They have a rapid flight, though not equal in that respect to the barn swallow. They can drink and bathe on the wing, without stopping for the purpose, by plunging hastily in the stream and then shaking themselves to throw off the water. They alight on the ground, and can walk with ease, notwithstanding the shortness of their legs, which is unfavorable to that kind of progression; but flying is their favorite motion; and in the air, they can make themselves formidable by the rapidity of their movements, to an enemy far superior in size. Even the eagle, if he comes in sight of the martin's box, is compelled to retire in disgrace.

The nest of the martin is made, toward the last of April, of sticks, willow twigs, grasses, leaves, rags and feathers. The eggs are white, from four to six in number. The male takes part in the work of incubation, and is very attentive to his mate. If no habitation is provided for them, they will dislodge bluebirds from their box, and after depriving them of their home, will add insult to injury, abusing them on every occasion. If no other lodgings can be

found, they will resort to a woodpecker's hole. But they are not often driven to such extremities; the industrious class of the community give them shelter for the sake of their morning call, which is the earliest that salutes the day. Their notes are generally pleasing, though not in the least musical; and the martin, aware of the estimation in which he is held, flies carelessly through the street, poises himself in the air to look into windows, hangs by the eaves of houses, plays with the kite-string of the children, or chases away the cat, who seems to be prowling in search of his young. As his food consists entirely of insects, his services are very useful. There is a tradition, that they first came into New England shortly before the revolutionary war, but whether their history resembles that of the cliff swallow, in this respect, or not, I am not able to determine.

The BARN SWALLOW, *Hirundo Americana*, like the preceding, is generally welcomed by the farmer, who knows that these birds are of incalculable service in protecting his cattle from the insects that torment them almost to madness, and therefore is wise enough to allow them a shelter among the rafters of his barn. In April they return from the south, and soon begin to build against the timbers, with pellets of mud from the borders of some neighboring stream, inlaid with slender grasses, which serve to bind it together. The eggs are white, spotted with reddish brown. When the young are fledged, the parents use persuasion to induce them

to come out from the nest, and try their first flight in the barn. When they have gained a little confidence, they go forth to some wall, fence or tree, where the parents can feed them without trouble. They soon become so expert in receiving food, that the parent can feed the young one, while both are on the wing. In fact, they seem in their element only when flying, their movements being easy and graceful, apparently without effort, and so rapid that no bird can equal them in fleetness. Before the close of summer, the barn swallows are seen in flocks, constantly increasing in number, and alighting on churches, barns or high trees, chattering gaily to each other, as if some interesting plan were in view. They are talking over the subject of their migration; and on some fair morning they set forth, following the course of streams or the sea beach, and thus with very little delay, proceed beyond the limits of the Union. The idea that these birds avoided the severity of winter by plunging into the mud, is now generally abandoned. No doubt many are found occasionally, on draining mill-ponds, and under circumstances which it is not easy to explain; but no one pretends that one swallow has been reanimated after its submersion, nor is there anything in the structure of the bird which authorizes us to suppose that it can live beneath the water. Least of all should we expect any such proceeding from a bird which can fly more than a mile a minute, and in a day or two can reach those regions where the flowers do not wither nor the leaves fall. When they return in the spring, the bank swallows,

which pass the winter in Florida, come first; the white-bellied follows; next, the purple martin; then, the barn swallows; and last, the chimney swallows. The probability is, that those which are latest in returning, come from the most distant winter quarters, and that the extent of their migration may be determined by the date of their usual reappearance in the spring.

The CLIFF SWALLOW, *Hirundo fulva*, was hardly known to naturalists till within a quarter of a century. The first account of its habits was derived from Long's expedition to the Rocky Mountains. Since that time the whole body have commenced a great system of emigration, moving gradually on towards the Atlantic, till now it is become quite common in many parts of New England. A peculiar sagacity is manifested by this and the chimney swallow. Its wild practice was to build against the sides of cliffs; but when it comes into civilized life, it builds under eaves and cornices, where its nest is partially sheltered from the rain. The first emigrants who came, informed the rest of their discovery, and induced the whole tribe to make a radical change in some of the most important habits of their lives. The nest is a large patch of clay mixed with sand, having an entrance near the top, rounded, projecting, and bent downward; the whole resembling a coarse earthen retort, with the neck broken off, stuck and flattened against the side of the building. The nest has a lining of dry grass and straw, on which are generally four eggs, white, with dusky spots. These

birds defend their nest, when attacked, with great spirit and resolution. They are not common as yet in the eastern part of the State, but in the west they begin to abound.

The White-bellied Swallow, *Hirundo bicolor*, is not so common in the western part of this State as either of the two preceding. It differs from them in never using mud in the construction of its nest, which is made of dry grass and lined with feathers. The eggs are four or five in number, of a pure white. Other swallows are harmonious and friendly to each other; but these are angry and quarrelsome. In taking their food, they make a snapping noise with the bill. This bird returns in spring earlier than any of its tribe, except the sand martin; and though not particularly friendly to its own kindred, it is on good terms with man, and well disposed to accept the lodgings which he provides.

The Bank Swallow, *Hirundo riparia*, is found wherever there is a sandy bank on the side of a pit or river. There it bores a hole with its bill, below the upper edge of the bank. Having opened it so far as to insert its body, it scrapes the sand with the feet, inclining the excavation upward, in order that the waste earth may fall out readily below. The depth varies, in different situations, from two feet to five; the end is enlarged in the form of an oven, to receive the nest. These birds are so gentle, industrious, and friendly to each other, that it is quite

interesting to see them engaged in their labor. They often, unfortunately, are compelled to work in vain. Idle boys destroy their tenement, or some *improvement* destroys the bank ; but they are so hopeful and persevering, that they will continue boring the earth, even when the shovel, day after day, destroys the results of their exertion.

The nest is formed with bits of dry grass and feathers. The eggs of the first brood are from five to seven, of a pure white. The young, as soon as they are able, crawl to the entrance, where they become a prey to crows and hawks, which lie in wait to catch them, both at that time, and after they have left the nest to perch in trees. In winter, these birds resort to East Florida, where they are seen by thousands. Audubon has discovered that there is another species, nearly resembling this, and often confounded with it. He has given it the name of rough-winged swallow, *H. serripennis.* The bill is longer, with the point of the upper mandible more decurved. The tail is shorter and but slightly emarginate. There are no feathers on the hinder part of the tarsus, as in the common species, and the wings extend half an inch beyond the tail.

The Chimney Swallow, *Cypselus pelasgius*, is a singular bird, which formerly, when the country was unsettled, made its nest and place of resort in hollow trees ; but having discovered that chimneys have an advantage over those wild tenements, and that a great proportion of them are not in use in the summer, it has now become familiar with man, and

abounds in almost all the towns and villages of the country. As soon as they arrive in May, they select a chimney for their encampment, where both sexes roost together at night; and if not disturbed in their rendezvous, they return to it several years in succession. Here they may be seen in the evening, flying round in broad circles, till it grows dark; at length, as one passes over it, he drops into it as if dead. One after another, at intervals, follows his example, whirring with their wings as they descend, and making a sound like distant thunder. They spend the night on the sides of the flue, clinging with their claws and resting on their tails, all in profound repose. At the first glimpse of daybreak, all are in motion, and they pour out in a rushing volume, as if the chimney were bursting out with flames; for a moment it trembles to its foundation; but the swallows disperse to their several cares, and it is left deserted for the day.

Each pair select a chimney in the neighborhood, taking one which appears to be disused for the season. Their first process is to collect twigs, which they break off in an ingenious manner, grasping them with their claws, and pushing the body suddenly against them, by which the stick is separated from the branch, with the end in the swallow's grasp. These they glue to the side of the flue with their saliva, to form the frame work of their nest, which is placed four or five feet from the top. In this rude basket-work their eggs are laid, without the semblance of a lining. They are white, and from four to six in number. In wet weather these nests

are often dislodged, and come down with the young in them; sometimes the young fall out of the nest. In either case, they scramble up the chimney and support themselves with their claws and their tail, till they are able to fly, in a place near the mouth of the flue, where the parent can conveniently feed them. Before the end of the summer they all disappear, leaving us earlier than other swallows, because they have a greater distance to go.

The WHIPPOORWILL, *caprimulgus vociferus*, is not often seen, because compelled, by its delicate sense of vision, to retreat into the forests to escape the blaze of day; but every one knows its wild and melancholy song, which, when it first arrives, is heard from the distant woods, but comes nearer as the season advances, and at last is heard very near the dwellings of men. The song of birds is always expressive of happiness; but the complaining notes of the whippoorwill seem to indicate suffering, and create a sympathy in the hearer, which the case of the bird does not call for; since, all this while, it is collecting moths, beetles, ants and grasshoppers; and, instead of foreboding change and disaster, it is employed advantageously for us, and no doubt to its own satisfaction, in destroying insects that trouble the repose of the cattle. The barn-yard affords it a foraging ground, which it often visits; sometimes it takes its station on the step of the house door, not chasing its prey on the wing, like the night hawk, but waiting till insects pass by; when they appear, it

rises to snatch them, and then resumes its position, and proceeds with its song.

The nest of the whippoorwill, if it can be said to have any, is a mere hollow place in the ground, in some retired part of the woods. The eggs, bluish white, with blotches of dark olive, are laid directly on the ground. The young are soon able to run about, and until they can fly, are sufficiently protected by their resemblance to the ground. This bird is very susceptible of cold; during the severe season of 1832, many of them were found dead in New England in the month of June. It would be no subject of regret if they were more common in Massachusetts, for their note is pleasant, heard in the silence of evening, and their services in destroying insects are not balanced by any injuries whatever.

The Night Hawk, *Caprimulgus Virginianus*, notwithstanding its popular name, is much less properly called a bird of night than the former. It flies in the day, even when the sun is shining, and retires to rest before it is late in the evening, about at the time when the whippoorwill begins his song. Its wings are very large in proportion to its weight, and its flight is firm and graceful; it sweeps in circles, sometimes rising high in the air, then shooting suddenly downward, with a sharp squeak, which seems to say that it has caught sight of its victim. In the evening, it flies lower than by day, often striking off wildly from its line of flight, doubtless to pursue some insect which its sharp eye has discovered. It

can hardly walk on the ground, nor even stand erect without resting on its breast. When it grows dark, it alights on the earth, or on fences, where it passes the night, giving a squeak now and then, as if it were still following its prey in dreams.

In May, the female deposits her muddy colored and freckled eggs on the naked ground, without any sort of preparation. The young, like those of the preceding species, are sufficiently guarded, by the resemblance of the down, which covers them, to the ground, in which they nestle. The food of the night hawk consists of insects, which it secures and swallows while flying. It is strange that Wilson was obliged to take so much pains to show that this and the whippoorwill are different birds, when, beside that one flies by day and the other by night, the whippoorwill is so formed, that he can walk firmly and fast, while the night hawk can hardly support itself on the ground, and, when it perches, is obliged to stand on the branch lengthwise, in order to lean upon its breast. Beside this, the closed wings of the former do not extend so far as the tail by two inches, while those of the night hawk are longer than the tail. In the night hawk the tail is forked, while that of the whippoorwill is rounded. It shows that Wilson labored in a field which had been very little explored, and it is wonderful that he did not leave more errors to be corrected, and deficiencies to be supplied, by later observers.

PIGEON TRIBE.

The Carolina Turtle Dove, *Columba Carolinensis,* is common enough at the western part of Massachusetts, where it is called the Mourning Dove, from the plaintiveness of its call, which is often heard in the woods. The sound seems expressive of deep affliction, but the bird that makes it is very happy, and quite unconscious of the interest which he inspires. When these doves come to the north in the spring, they disperse in small parties, and it is not often that more than two are seen together. They are generally met with in roads through the forest, to which they resort in order to dust themselves and swallow gravel. They are by no means shy, though unobtrusive in their manners; they are sometimes seen among the domestic poultry, as they go to be fed at the farmer's door. Occasionally they join the flocks of passenger pigeons, and are taken in snares, together with their relations. Their food consists of grain and small acorns, together with poke, partridge, and dogwood berries, in their season. They are said to be easily tamed, and to raise their young in confinement; if so, they would reward attempts at domestication, since the flesh is pronounced equal to that of the woodcock, by those who profess to be judges of such matters.

The Passenger Pigeon, *Columba migratoria,* is a hardy wayfarer, which cares very little for climate, and is governed in its migrations, not by the desire

to escape a cold climate, or to build its nest in a mild one, but simply by the necessity of going where food abounds, because no small supply will satisfy the appetite of such immense numbers. Having powers of vision equal to their power of flight, they can easily take a survey of the country over which they are passing; if they determine to descend, they break the force of their motion by repeated flappings of their wings, to keep themselves from being injured by dashing upon the ground. So swiftly do they move over an immense extent of country, that they have been killed near New York, with their crops full of rice from South Carolina plantations. In the Atlantic states, their numbers are nothing compared to the countless multitudes which assemble in the west, where, as they pass over, the rush and roar seem like those of a tornado, darkening all the sky. But their numbers, though reduced from those of former times, are still considerable, and as soon as it is known in a neighborhood that the pigeons are flying over, it is the signal for assembling all the arts and instruments of destruction. Many are shot with the gun; many are taken with nets; and others are decoyed by pigeons with their eyes blinded, which are stationed on a roost, provided for the purpose; the roost being shaken with a string, these pigeons open their wings to balance themselves; and the wayfarers, supposing that they have just alighted, after examining the region, think it safe to come down and join them without farther investigation.

The accounts of the breeding places of the pigeons at the west are almost incredible. Some of them extend several miles, covering thousands of acres; the grass and underwood is all destroyed; the ground overspread with limbs, broken down with the weight of the birds clustering upon them, and the trees killed as completely as if girdled with the axe. When the young are fully grown, but have not yet left the nest, a general invasion is made upon the spot. Hawks and eagles snatch them from above; hogs devour the thousands that fall to the ground; the axe-men cut down the trees most loaded with nests, and the crash of falling timber mingles with the thundering roar of the wings of ten thousand pigeons. One large tree, as it descends, often brings down several others, and two hundred squabs have been gathered by means of a single fall. The multitudes of birds are continually breaking down large branches with their weight, so that it is dangerous to walk below.

There is some disagreement in the accounts given of their breeding. Wilson maintained that there was but a single young one in a nest; while Audubon asserts that there are two. The prodigious numbers of the birds would seem to confirm the statement of the latter. The young come to maturity in six months. Every year they, at least, double their numbers.

One office of the pigeon seems to be to protect the oak forests. It is stated, on excellent authority, that for some years after they have occupied a particular spot as their breeding place, the oaks, for

many miles around, are remarkably free from the green caterpillars, by which they are apt to be infested.

GALLINACEOUS BIRDS.

The Wild Turkey, *Meleagris gallopavo*, was formerly common in all parts of the United States, but has gradually disappeared before the encroachments of civilization, and is rare, except in the unsettled regions of the west. It is still found occasionally in our western mountains, and also on the Holyoke range, where some are taken almost every year. Its migrations, like those of the pigeon, are irregular, having nothing to do with seasons, and are governed wholly by the supply of food. This fine bird is so uncommon in Massachusetts that it does not seem necessary to describe it at large; in a few years it will doubtless leave us forever.

The American Quail, or Partridge, *Perdix Virginiana*, is quite common in Massachusetts, where it bears the former name; in the southern and western states, it is always known by the name of Partridge. It remains with us throughout the year, and sometimes suffers so much from the deep snows, that it may be seen in the sheds and near the houses of our largest villages, in search of shelter and food. A party will sometimes resist the cold by collecting in a circle, pressing close, with their heads outward,

borrowing warmth from each other; but in our fiercest winter storms they sometimes perish under the drifted snow.

The quail is a gentle bird, and fond of associating with its own race, though not in large numbers. It generally resorts to open fields in search of food, such as grain, buck wheat and Indian corn. It sometimes joins the parties of domestic fowls, and scratches the ground after their example. Though it is fond of grain, it requires something more for its support; and the demand of the young quails for insects makes the chief difficulty in the way of its domestication. The female prepares a nest of various grasses, arranged in an oven-like form, under the protection of a tuft, and partly sunk in the ground. The eggs are from ten to eighteen, of a pure white. The male takes part in sitting, and as soon as the young are hatched, they are able to leave the nest. Wilson believed that the quail might be domesticated. Its eggs have sometimes been hatched by the common hen, and the chickens are sufficiently tame; but though kept through the season and the succeeding winter, they go away in the spring. Two that were brought up by a hen, as soon as they were turned off, associated with the cows, going with them to the pasture in the morning, returning at night, and standing by them when they were milked, waiting to share their lodgings in the barn. These, however, contented as they appeared, deserted, like all the rest, in the spring. This wildness might, after a time, be overcome; but there would be more difficulty in supplying all the food they require,

and after all it would be doubtful whether success would repay the care and attention which it would demand.

The note of the quail is well known, being generally interpreted into the prediction, *more wet*, *more wet;* the sounds are continued for a long time. This note of the male is most frequent and loud in the month of September. Sometimes there is an introductory whistle preceding the clear and emphatic *more wet*, or *bob white.* This call may be easily imitated so as to deceive the bird. When a covey are about to take wing, they make a sound resembling that of young chickens; when they separate, the parent assembles them by a plaintive and expressive call.

The Ruffed Grous, *Tetrao umbellus*, is called pheasant in the middle and western states, and partridge in New England; a confusion of names somewhat perplexing. These elegant birds generally keep themselves within the shelter of the woods, and prefer those which grow on the sides of mountains. There they can find their food at all seasons; it consists, in spring and autumn, of the buds of various trees, the catkins of the alder and hazle, and all the berries that the fields and forest afford. In winter, they live on the buds of apple-trees, laurels and azaleas, together with the berries of the wintergreen, and the favorite partridge berry, which they are able to rescue from the snow.

The ruffed grous begins its drumming in April; the sound is heard most frequently at the beginning

and at the close of day. It is produced by the male, who beats his sides with such a rapid motion as to make this sound resembling distant thunder, which is heard at a prodigious distance in the woods. It is said to be imitated by striking an inflated bladder with a stick; on hearing it, the male takes it for a challenge, and as he comes forth to do battle with his supposed rival, he falls an easy prey. The nest is constructed in May. It is little more than a handful of leaves, spread under a bush, or at the side of a fallen log, and, unlike that of the quail, it has no roof above. The eggs are from nine to fifteen, brownish white. The young leave the nest as soon as hatched, and are led by the mother with a cluck like that of the hen. If the family are surprised, the mother resorts to arts like those of the quail, throwing herself on the ground, fluttering and beating with her wings, as if hardly able to move; and while she thus draws off the attention of the intruder, she calls to the young to disperse and hide themselves. They do this so effectually that they are seldom found, though they only creep among the dry leaves, or remain perfectly still, trusting that their resemblance to the earth will conceal them from an unfriendly eye.

The old birds, when hard pressed by the hunter, if there is snow on the ground, save themselves by diving into it, and working their way out at some distance from the place where they went in. Much as they are pursued, they are still abundant in New England, and the wildness of their habits will save them from extermination so long as the forests

are permitted to last. They are now cut down with wanton profusion; and as fast as they are cleared away, birds of this description are driven to other regions less infested by man.

The Pinnated Grous, *Tetrao cupido*, was once very common in New England, but, being more shy than the preceding species, it has already been driven from all but a very few places, where it is comparatively free from intrusion. Audubon says, that when he first went to Kentucky, they were so abundant, that they could hardly be given away; now, hardly one can be found in the state, and they are, in like manner, fast disappearing from all the settled parts of the west. In Massachusetts, laws have been enacted to preserve the heath-hen, as it is commonly called; but it is impossible to withstand the operation of the law of nature by legislative enactments, and the same causes which have removed the greater proportion will soon deprive us of all. The better way is to try the experiment of domestication; the bird is easily tamed, and breeds in confinement. Some which Audubon kept for the purpose, soon became familiar, and would eat from the hand as readily as common fowls. Unfortunately, they became so destructive to the vegetables of the garden, that he was obliged to have them killed; but the experiment proceeded far enough to show, that neither the natural wildness of the bird, nor the want of proper food, would prevent their being reared by any one who is willing to take the trouble.

The grous feeds on berries of various kinds, in

their season, the acorns of dwarf oaks, and the buds and leaves of trees. In summer, they pick whortleberries and cranberries, and sometimes venture into a field to pick the leaves of clover. It is said, that, sometimes in winter, when they are hard pressed with hunger, they will feed on the buds of the pine. They are also known, under those circumstances, to join the domestic poultry.

The *tooting*, for which these birds are remarkable, is produced by means of the air bags at the side. When these, resembling a small orange, are inflated, the bird lowers its head, opens its bill, and sends forth the air contained in these receptacles, in a succession of rolling notes, like those of a muffled drum. In parts of the country where the birds are become few and wild, this sound is seldom made after sunrise, and sometimes the battles of the rival males are carried on in silence, and the *scratching grounds* carefully concealed.

The nest is built in May, with dry leaves and grasses, interwoven, and is carefully placed amidst the tall grass of a large tuft, where it is not often discovered. The eggs, from eight to twelve in number, resemble those of the preceding species, though somewhat larger in size. The female sits nearly three weeks, and as soon as the young are hatched, leads them away from the nest. When surprised, they conceal themselves, like young partridges, and one may search for them in vain, though perhaps he is treading them under his feet. In autumn, the different families associate together, sometimes in very large parties. Their most dangerous enemies

are the hawk, the skunk, and the greatest of all destroyers, man.

The only place where they are now found in Massachusetts, is in Martha's Vineyard, and one small island near it; and there, though pains are taken to protect them, they are said to diminish fast, the high price which they command in the market, being a strong temptation to shoot them. Cats, also, which run wild in the island, do their part in the work of extermination. The wonder is, that with all their timidity, they have remained so long, but their patience and their attachment to their old haunts will be wearied out, and other means must be found to gratify the epicure's taste, and the sportsman's love of pleasure. The order of nature supplies such game, as a resource for the pioneers of civilization, while the process of clearing the soil goes on; till the earth is subdued, the deer, the birds, and the fish, supply means of sustaining life. But when agriculture, and the other arts of life, begin to be pursued with profit and success, these resources cease to be needed; the habits of the hunter are inconsistent with regular industry; and as the game would only serve to tempt men away from their cares and duties, the forests and streams are deserted, and their wild tenants go where there are other adventurers who need them. If the gallinaceous tribes can be preserved, it is by domestication, not by law. Experiments should be made for several years in succession, and if these fail, we must make up our minds to lose them.

WADING BIRDS.

The Sanderling, *Calidris arenaria*, is an autumnal and winter visiter, which arrives from its northern breeding places in August, and spreads along the coast from Maine to Florida. They are seen in flocks, running in the face of the waves, and uttering a plaintive whistle, as they gather the small shell fish, insects, and other minute animals, with which the beach abounds. This bird obtains much of its subsistence by inserting its bill obliquely in the sands; it does this with great activity, and when the tide is going down, great numbers of the holes which are made by this process, are seen upon the wet beach. They can run very fast upon the sands; their flight is rapid, but they generally alight at no great distance from the spot whence they started. When they return to us in autumn, from the northern regions, they are in good order for eating, and their flesh is much esteemed.

The Black necked Hilt, *Himantopus nigricollis*, if known at all in Massachusetts, appears only as an accidental visiter. Dr. Brewer tells me that a bird, somewhat answering to the description of this, has been seen occasionally near New Bedford, but he has never obtained a specimen.

The American Oyster-catcher, *Hæmatopus palliatus*, is found along our whole Atlantic coast, but more rarely in New England than in other parts of

the country. It spends the winter in the south, and returns to the north in spring. Its breeding places extend from the middle states to Labrador, where it was found breeding in July. Dr. Brewer informs me that he has once found this bird in Massachusetts. We learn from Audubon, that he has never found the *Hæmatopus ostralegus*, described by Wilson, in any part of this country, and, though he does not say it is not to be found, it is more likely that this species has been mistaken for it, than that it should have escaped his searching observation. This bird is exceedingly difficult to approach, flying off the moment it perceives that any one is watching it; so that it was only with a telescope that he could observe its motions, as it probed the sand with its bill, tore off the limpets by inserting its bill as a wedge between the fish and the rock, or beat a shell fish against the sand, for the purpose of breaking the shell. These birds return to the south early in October.

The Golden Plover, *Charadrius pluvialis*, is a common bird on our coast in spring and autumn, when they return from their breeding places in the north, and prolong their stay, till they are driven away by the approach of winter. They live principally on such insects as are found in the vicinity of the sea; they are sometimes seen patting the earth with their feet, to force out the worm from his burrow, but when grasshoppers are to be had, they appear to be the plover's favorite food. They assemble in such immense flocks, that on one occasion,

when Audubon accompanied some French gunners from New Orleans to shoot them, one man killed sixty-three dozens in the course of the day. When they are about taking their departure, they assemble in large flocks in the morning, though they rest apart from each other at night; and at such times, they are caught in great numbers in nets, which they are driven into by creating a panic among them. No difference can be detected between this and the golden plover of Europe; it is doubtless the same with the bird so abundant in the Hebrides, and found in most parts of the known world.

The Piping Plover, *Charadrius melodus*, so called from its pleasant, though plaintive note, is found along our whole coast in summer. They spend the winter on the shores of the southern states. In the spring they proceed to the eastward in pairs; if they find a suitable breeding place on the way, they alight and take possession, and as they are soon joined by others, they soon form a considerable party. In autumn, they move in flocks of twenty or thirty, always keeping near the shore. Its flight is strong and rapid, but it is more remarkable for its swiftness in running, which is so great, that it eludes the eye, and reposes quietly on the sand, which it so much resembles that it has no fear of being detected. I have no information of its nest having been found in our State, but it can hardly be that it should breed so far on each side of us, and yet pass us by. The piping plover is valued as game, but the sportsman generally gives his attention to birds of larger size.

Wilson's Plover, *Charadrius Wilsonius*, a species resembling the preceding, and named in honor of the great ornithologist, is a constant resident in the southern states, but was supposed never to come farther to the east than Long Island. Audubon thought it strange that its range should be so limited, compared with that of the piping plover. I am, however, informed by Dr. Brewer, that Wilson's plover was abundant at Nahant, in August of the last year. It was probably some irregular movement, which would not be repeated every year, since it is hardly to be supposed that the bird should be often in our limits, and yet escape the eye of so many accurate observers.

The Kildeer Plover, *Charadrius vociferus*, is a common bird, which spends the winter at the south, but returns early in the spring, leaving the coast and spreading over the inland country, where it is found in open fields, and on the banks of streams, and known by the name of *kill-dee.* It seems to have great sagacity in suspecting danger. In the presence of horses, cows and sheep, it is perfectly indifferent ; but if a man or dog appears, it betrays extreme uneasiness and distrust. When they move in small flocks, they appoint one as sentinel, who stands on tiptoe, watching all the objects around ; when any thing appears, in the least suspicious, it sounds the alarm, and the place is at once deserted.

The kildeer plover makes its nest on the ground of a field, or the sand of the downs, sometimes lining it with grass, at others laying the eggs on

the naked earth; they are four in number, of a cream color, blotched with black; the young run about as soon as they are hatched, and the parents are kept in perpetual agitation by fears for their safety.

The food of the kildeer consists of grasshoppers, crickets, snails and earth worms. They often strike their bill into the ground, in search of their prey. In the meadow, they pat the ground, to force out the worms, and sometimes follow the ploughman, to seize those which he has turned out from the ground. They have a peculiar motion of the body, when about to pick up their food, in order to bring their bills to the earth to reach their prey. The flesh of this plover is often eaten in the fall, but at other seasons it is poor and ill flavored; indeed, there is hardly any time when it is worth the trouble of shooting.

The Semipalmated Plover, *Charadrius semipalmatus*, is not an uncommon bird, and is seen on our coast in the spring, from the last of April till the end of May; then it goes to high northern latitudes to spend the breeding season, at which time, Dr. Richardson assures us, they abound in the arctic regions. As soon as the young have acquired strength for the journey, they set out on their return, and early in August they again make their appearance on our shores. They feed on land as well as marine insects, though they are generally seen playing before the waves on the beach. They are found in the markets of our cities at the close of summer, and are well esteemed for food.

The Black-bellied Plover, *Charadrius Helveticus*, called sometimes the large Whistling Field Plover, because of its attachment to newly-ploughed fields, where it finds the insects and berries which compose its food, is found over a large extent of country, having breeding places from Pennsylvania to the most distant northern regions known to civilized man. It often chooses the field for the place of its nest, which is carelessly made of dry grass, and in which are laid four eggs, of cream color, dashed with black. Nuttall says, that their nests are of rare occurrence in New England, but does not say whether he had ever found them. In the summer they feed on various berries, and are valued as food. At the close of August, they go down with their young to the borders of the sea, where they live on such materials as the shores afford them. They are called the beetle-headed plovers, and sometimes the kildeer, from their cry, in which they resemble that restless bird, as well as in their never-resting suspicion. Toward the last of September they collect in great flocks, preparatory to their migration, but linger with us for a considerable time before they go.

The Turnstone, *Strepsilus interpres*, derives its popular name from the habit of turning over stones with the bill and sometimes the breast, to find insects and worms beneath them, a habit which they are said to retain when in a domesticated state. They arrive in the spring, and linger on the shores till the summer, when they hurry away to the deso-

late coasts of the northern ocean, where they breed. They return in August, and, as the weather grows cold, move off to the south, extending their migration over a vast extent of country. The turnstone flies with a loud twittering note, and runs with its wings lowered, but not rapidly. They do not collect in great numbers, like the sandpipers, but are seen in small parties of three or four. The bill resembles that of the nuthatch, and is used with great skill in collecting food. It is strong enough to break the shells of many small shell fish ; from others, it picks out the flesh like the oyster catcher.

The Great Blue Heron, *Ardea herodias*, is a constant resident in Massachusetts, searching for its prey, in winter, in springs and ponds, which are not sealed up by the cold. It seems indifferent to climate, but is not found very far to the north, though it is seen westward as far as the Rocky Mountains. It is a shy and suspicious bird, with most penetrating and far-reaching powers of vision, so that it is extremely difficult to approach it, except in the depth of the wood. Their principal food is fish ; but they have an extensive bill of fare, embracing frogs, lizards, meadow mice, young rats, snakes and birds. It does not refuse insects when it can find nothing better ; but it prefers fish, and has been known to expose itself so much in order to secure it, as to plunder a pond of its gold fish. It suffered the penalty of its transgression, but not till it had eaten the last fish. The amount which it will devour exceeds belief. These birds have great strength and spirit, so as to

make it dangerous even for a man to encounter them, since they seem to know the points most unguarded, and always aim at the eye. The blue heron breeds, under various circumstances, sometimes in communities, sometimes apart; some nests are in very tall trees, some lower, and others are on the ground. The eggs are three, of a bluish white color, and larger than those of a hen. The old ones provide very liberally for the young till they are able to shift for themselves, when they turn them adrift without ceremony, and, from want of experience, they often suffer for the want of food. They take three years to reach maturity, and even after that period they sometimes continue to grow.

The Great White Heron, *Ardea egretta*, is, according to Audubon, sometimes seen as far eastward as Massachusetts.

The White Heron, *Ardea alba*, is inserted on the authority of Audubon, who, as Dr. Brewer informs me, has ascertained that it is sometimes found in this State. Its principal residence is in the southern regions, and when it comes to the north, it is found on the low marshy shores of rivers and broad swamps, where it is open to view, but contrives to escape from injury by its watchful suspicion.

The Snowy Heron, *Ardea candidissima*, is inserted on the same great authority; but it seldom comes farther to the north than New York. It was said to

proceed as far as the gulf of St. Lawrence, but Wilson was probably misled by his informer. They come from the south in May, and in summer they are seen along the coast from this State to the gulf of Mexico. It is a fine looking bird, with animated and graceful motions; if wounded, it defends itself vigorously, and sometimes inflicts a severe wound. The fall of the leaf is the signal for its departure. This heron is often exposed for sale in the southern markets, and, in the early part of autumn, the flesh is said to be good.

The NIGHT HERON, *Ardea nycticorax*, called the Qua-bird from its peculiar call, is found in the southern states throughout the year, but many of them come to the north in spring, and their breeding places extend as far eastward as Maine. One of their breeding places is found in a marshy island in Fresh pond, in Cambridge, where they continue to resort, though exposed to much persecution. Their sight by day is imperfect; but the sense of hearing is so quick, that it is very difficult to approach them. They have a strong and steady flight, and seldom alight on the ground, without first resting on the neighboring trees to examine the spot. On the ground it walks stooping, and is constantly moving about in search of food, which consists of frogs, tadpoles, water insects, and fish, which it wades deep in the water to procure. When satiated, it retires to a tree or a swamp, and there reposes on one leg, but starts from its slumber on the least alarm. When taken, it defends itself with its bill, but some-

times uses its claws with serious effect, making a rough and angry sound, and constantly attempting to escape.

The nest is formed of sticks arranged on each other so carelessly, that it is sometimes overset by the young. The eggs are four in number, of a light sea green. The young remain a long time in the nest; as soon as they are able, they climb to the tops of the trees, and there wait to be fed. Their flesh is said to be as good as that of the pigeon. They undergo three annual changes of plumage before they reach their mature state.

The American Bittern, *Ardea minor*, sometimes called the Night Hen, from its nocturnal habits, is a retired bird, which remains hidden in the reeds and sedge throughout the day, never leaving its retreat, except in cases of alarm. It then flies off with a hollow cry, and as its motions are heavy, it is easily brought down. They feed mostly in the night, and it is in the dusk of morning and evening that their booming note is usually heard. They breed in the northern regions, where their nests are made in swamps among the coarse grass; the eggs are four, of a green color. They also breed in this State.

The Green Heron, *Ardea virescens*, is better known than any other of the tribe, and, without any reason, is held in general contempt. He cares very little, however, for the scorn or favor of man, and neither seeks nor fears his society. He prefers the solitude of swamps and marshes, where he can asso-

ciate with birds of habits similar to his own, and there seeks his subsistence from the waters or the muddy shores. If fishes or frogs make their appearance, for which he waits patiently, he seizes them with great adroitness; dragonflies and other insects also serve to help out his fare. When surprised, he rises with a hollow scream, but flies only to a little distance, as if considering just how far it is necessary to go. The nest is made of twigs, and placed on trees; the eggs four, of a pale blue. They sometimes breed apart, sometimes in company with each other, and not unfrequently put themselves under the protection of the larger herons. They come from the south in April, and return in October, not in large flocks, but in small family parties.

The LEAST BITTERN, *Ardea exilis*, the smallest of this class of birds, is so slender that it can pass between two books set an inch apart from each other, without displacing them. From their habit of retiring into extensive marshes, they are but seldom seen, as they rise only in sudden alarm. At such times, they fly slowly and timidly; but, like other nocturnal birds, as the enemy comes on, their flight grows confident and strong. Its food consists of snails, tadpoles, field mice and moles, which it collects, sometimes by day, but more frequently at night; in the day, they sleep so soundly that they are sometimes approached and caught in the hand. Their nest is among coarse grasses, and either on the ground or attached to the stalks a little way above it. It is formed of dried weeds, and contains three

or four eggs, of a dull yellowish green. Though they breed here, their nests are seldom found, and no one has yet given an account of their migrations.

The Bay Ibis, *Ibis falcinellus,* is a rare and accidental visiter, inserted on the authority of Nuttall, who says that a single specimen is sometimes offered for sale in the market at Boston.

The Long-billed Curlew, *Numenius longirostris,* is seen in Massachusetts in the spring, on its way to the north to breed; in August they return, to spend the winter in warmer regions. Dr. Brewer tells me that he has seen large flocks of them at Nahant, and they are offered for sale in the market in Boston, at the close of the summer. The name curlew, is an imitation of their cry of alarm, by counterfeiting which, the fowler takes advantage of their sympathy, and brings them within his fatal reach.

The Esquimaux Curlew, *Numenius Hudsonicus,* passes the winter at the south, and returns in the spring, on its way to the north, where it breeds ; but in what place is not known. Audubon could not find them at Labrador, nor learn that any had ever been seen in that country. In August and September they return, and many of them are shot in Boston harbor. They are found in pastures as well as marshes, feeding on grasshoppers and berries, till the time of their departure, when they assemble in large flocks, preparatory to their migration.

The Small Esquimaux Curlew, *Numenius borealis*, like the preceding, goes to the north in the spring. Though they abounded at Labrador, Audubon found none remaining to breed there; they also proceed beyond Hudson's Bay; but Dr. Richardson succeeded in finding a nest at Point Lake, in the month of June. At the close of summer, these birds arrive in company with the preceding, and feed, like them, in marshes and pastures. They are also valued as game. Though sufficiently common here, this bird is hardly ever seen in the southern states, which it must pass through or pass over in its annual flight. Even Audubon, before he went to Labrador, had never seen more than a single specimen, furnished by Mr. Oakes, of this State.

The Curlew Sandpiper, *Tringa subarquata*, is an exceedingly rare bird; inserted here, because Audubon tells us that of the few specimens which he has ever seen, two were procured in Boston.

The Red-backed Sandpiper, *Tringa alpina*, is called in England the Dunlin, in this country the Red-back, or the Ox-bird. They make their way to the north in the spring, where they go far within the arctic circle. In September they return, and are seen in company with other sand birds, running gaily before the breaking waves.

Schinz's Sandpiper, *Tringa Schinzii*, has been found by Mr. Oakes in this State. Bonaparte says it is common in autumn, on the coast of New Jer-

sey. They resemble other sandpipers in their habits and food, but even Audubon has never found them breeding.

The PECTORAL SANDPIPER, *Tringa pectoralis*, is more abundant on the shores of Massachusetts Bay than in any other part of the country. They arrive at the last of August, and remain till the fall of the leaf, feeding on insects and a kind of seaweed. Their northern breeding places are as yet entirely unknown.

The BUFF-BREASTED SANDPIPER, *Tringa rufescens*, is not uncommon in the Boston market, in August and September, but so rare in other parts of the country, that Wilson never saw it, and Audubon first met with it in England. He received a wing of this bird from Captain Ross, that was picked up by a sailor on the Arctic expedition, and this is all we know concerning it in the regions where it must undoubtedly breed. Here it associates with the preceding species, which it resembles in form, though not in plumage, and feeds with it, on insects, particularly grasshoppers, which abound in the neighborhood of the sea.

The BROAD-BILLED SANDPIPER, *Tringa platyrhinca*, is very rare in the United States, but I am enabled to add it to our list, on the authority of Mr. S. Cabot, Jr., who procured a specimen at Nahant, the only one which, to my knowledge, has been found in Massachusetts.

The Purple Sandpiper, *Tringa maritima*, is another of these wanderers, which abounds in autumn, and is sold in the market at Boston, but is less common in other parts of the United States. They fly in flocks of eight or ten, avoiding sandy beaches, and alighting on rocky shores; from which peculiarity in their habits, they are sometimes called *rock snipes*, by the fowlers. Audubon did not find them breeding at Labrador, but Dr. Richardson says that they breed abundantly on the shores of Hudson's Bay.

The Little Sandpiper, *Tringa pusilla*, which is, as Dr. Brewer informs us, the same with Wilson's Sandpiper, is known by the name of *Peep*, and is found, in its season, on all the shores and in all the markets of the Union. It goes to the north to breed, like the rest of the tribe; but returns in the early summer, in large flocks, roving from place to place in search of food. Its bill is pointed and flexible; and in order to collect its fare of worms and insects, the bill is inserted in the mud or wet sand, after the manner of the woodcock. This bird leaves us before the fall of the leaf, and passes the winter in distant southern regions.

The Knot, or Ash-colored Sandpiper, *Tringa cinerea*, appears on our coast in May, on its way to the north, whence it returns before the end of summer, and is seen in large flocks, collecting small shell fish along the strand, moving with great adroitness under the edge of the waves. The shell fish

are swallowed whole; but the birds grow fat upon them. While thus employed the birds are easily approached; nor does the fate of those that are shot strike any fear into the survivors.

The Semipa mated Sandpiper, *Tringa semipalmata*, is sometimes confounded with the peep, with which it often associates; but is obviously distinguished from it by its half-webbed feet. This habit of keeping company with other birds has prevented accurate observation of its periods. Wilson says that it arrives and departs with the sanderling, and associates with the red back, though in flocks apart from each other. They are found in the salt marshes near Boston, and are considered better eating than any other of the small birds.

The Semipalmated Snipe, *Totanus semipalmatus*, is not common in Massachusetts, though it is found near Boston, and occasionally breeds near New Bedford. It is known by the name of *Willet*, a sound resembling its usual cry. It is a shy and artful bird, and not approached by the fowler without cunning equal to its own. It makes its nest on the ground in the marsh, constructing it with the coarse grass which grows on the spot; it contains four eggs, of a yellowish olive, blotched and speckled with dark umber. In the autumn, the young are known by their grey color, and are marked out by the fowler as excellent game. They come to us before the end of April, and return before winter to the southern states.

The Tell Tale, *Totanus vociferus*, whose name is given in consequence of its habit of sounding an alarm to all birds within reach, whenever the fowler is nigh, and thereby saving many ducks from the fate that would otherwise await them. In Massachusetts they are uncommon. Though they sometimes touch upon the capes in considerable numbers, it seems only a stop for the purpose of resting in their migration.

The Yellow Shanks, *Totanus flavipes*, is a common summer resident in this State. Its breeding place extends from the middle states to the high northern regions; but common as the young birds are, the nest has not yet been found in our borders. Its breeding place in Nova Scotia is found in the grass on the edges of ponds and rivers. The bird resides chiefly on flats and marshes, and is seldom seen at any considerable distance from the sea. Their food consists of small fish, aquatic insects and worms. It is a shy bird, which often gives an alarm to others that are less on their guard; but they do not associate with other birds, though often seen near them. When alarmed they run to some distance before they fly; when they take wing, they are known by their long yellow legs, stretched out behind them to steer their flight. It has been said, that when one was shot its companions would gather round it; but, like other creatures, their sympathy is principally vocal, and seldom indulged at any risk to themselves.

The Solitary Tattler, *Totanus chloropygius*, is seen in Massachusetts in the autumn, on its way from the north, where it breeds. Dr. Richardson says that it makes no nest, but lays its eggs on the naked beach, or the gravel. It is very unsuspicious; and when it takes wing, returns to the same place after a wheeling flight, and contents itself with occasional glances at the observer. The solitary habits, however, from which these birds derive their name, protect them; since their numbers are too small to tempt the sportsman. When so wounded as to be unable to fly, they take to the water to save themselves by swimming and diving. Nuttall says that two of these little birds frequented the fish pond in the Botanic Garden at Cambridge, in search of the insects which feed on the water lily; these they secured by stepping lightly and with expanded wings over the leaves which rested on the water.

The Spotted Tattler, *Totanus macularius*, is one of our most common birds from May to October. From its note, it is called the Peet-weet, which is its familiar name. It is seen about creeks and rivers, flying in winding sweeps and sounding its clear whistle. When the young are added to the company, they keep up a constant call to each other, so that the whole region is eloquent with the sound. They usually breed in meadows, in nests made of the grass, slightly arranged for the purpose, with a lining of hay. Sometimes they lay directly on the ground. The eggs are four, cream-colored, with spots of brown. The female practises the same arts

with the quail, to secure her young, and they, when alarmed, trust to their color, and remain motionless on the ground.

Bartram's Tattler, *Totanus Bartramius*, is a bird first described by Wilson, who found it on the banks of the Schuylkill, and named it in honor of his friend. It is common on the sea coasts, but not confined to them; it extends into the country, where it is called the upland plover, and is seen running through the grass in search of insects; grasshoppers being its favorite food. Its breeding range extends from the middle states to the fur countries; to these it returns in the month of May, when its nests are made in various parts of the State. They keep in small parties, and are always suspicious of danger; when alarmed, they run fast, and make a sharp whistle as they take wing to fly. Fearful as they are of man, they are great friends to the cattle. They commonly find food in such abundance, that they grow very fat, and their flesh is considered a great luxury.

The Marbled Godwit, *Limosa fedoa*, is a visiter in this State in the spring and autumn, on its way to and from the north, where its breeding places are but little known. In August they appear in large numbers, and many are shot for the table, though their stay is very short, and their habits are shy. The fowler has little chance of success, except he resorts to stratagem, or alarms and confuses them by shooting one of the number; in which case they

hover round the fallen, with many complaints of what has been done.

The Hudsonian Godwit, *Limosa Hudsonica*, is not common here, though it abounds in its northern breeding places; so that the great proportion must travel and return over land, or turn away to the northwestern shores. Audubon never saw it, till he found it in the Boston market, where it is called the goose bird. Dr. Brewer tells me that he doubts the existence of *L. fedoa* in America, and suspects that the bird so called, will turn out to be the adult of the present species.

The Red-breasted Snipe, *Scolopax grisea*, arrives on our coast, from the south, in April, and spends three or four weeks, never going far from the shores, and frequenting the flats and sand bars, at low water, in search of food; while so engaged, they can be approached more easily in a boat than on the shore, and as they often settle very near each other, great numbers are shot down. Their breeding places must extend from the northern shore of Lake Superior to the coast of the Arctic Sea, but their nest and eggs have not yet been described. In July, they return with their families, and are considered a great luxury for the table. They find abundance of food, by inserting their bills in the ground and drawing out the larvæ of water insects, which are hidden below. They also make use of some plants and seeds; and, like many other birds, swallow gravel to aid in disposing of their food.

The American Snipe, *Scolopax Wilsonii*, was first shown by Wilson to be different from that of Europe, and is therefore honored with his celebrated name. It is well known to sportsmen, who take advantage of its local attachment, and by ascertaining its favorite resorts, are able to shoot large numbers. They arrive early in the spring, from their winter quarters in the south, and are found on meadows and low grounds, when, at evening and early in the morning, their peculiar murmur, which cannot be described by words, is heard proceeding from these birds, soaring high in the air. It does not seem to be owing to the beating of the wings, as one might suppose from the sound; it is, no doubt, a call of love, since, after the time of incubation ceases, it is heard no more for the season. This bird breeds in soft marshes, where man cannot easily disturb it, laying its eggs in a hollow, loosely lined with grass. They are four in number, of a yellow olive, speckled with light and dark brown. The young leave the nest as soon as hatched. Their bill is, for some time, soft and easily bent; meantime they feed on small insects, such as lie on the surface of the wet soil; as they grow older, they learn, like their parents, to strike the bill firmly into the ground. When one of them alights, it listens to see that all is safe, then strikes its bill into the ground several times, in quick succession, till it is satisfied, when it lies close till the evening. Their security and defence generally consist in lying still. When suddenly startled, they fly in a zigzag course, to elude the aim of the fowler, and it is so difficult to

shoot them, that they are most frequently caught in snares. Their food consisting of insects, ground worms, and juicy roots, they grow fat, and are in great demand for the table. Many epicures are said to eat the bird with all that is in it when killed, making no selection; but, inasmuch as leeches are part of its fare, and are not considered luxurious food for man, it is as well to eat this game with more discrimination, and less gastronomical taste.

The American Woodcock, *Rusticola minor*, is a very common bird, but not often seen in the fields, except by sportsmen, because of their nocturnal habits, in which they exceed the snipe, hardly ever flying in the day time, and travelling and feeding almost exclusively by night. They remain in woods and thickets till evening, when they proceed to the broken soil in search of worms and insects, and leave perforations made by their bills in the soft ground, showing where they have been. They have such delicacy of perception, by means of the bill, that they make but little use of the eyes in feeding; they plunge their bills up to the nostrils, and suck up their prey. The eyes of this bird are placed high, and far back in the head, probably for the purpose of seeing enemies at a distance, and watching their motions, without betraying the place where it lies, by any movement on its own part.

The woodcock returns from the south very early in the spring, and soon after selects a breeding place in the woods, where the nest is set on the ground, and formed of dry grass and leaves. The eggs are

four, of a yellowish clay color, and marked with blotches of purple and dark brown. The young leave the nest as soon as hatched, but three or four weeks elapse, before they are able to fly. During the time of incubation, the male rises in a spiral flight, after the manner of the snipe, making a hurried sound as he ascends, which increases as he descends, when it becomes loud and sweet. When he touches the ground, he makes a bleating sound, with a forward movement of the body, and then waits to see if his call is answered. The woodcock, unlike the snipe, which never flies through the woods, often goes into the depth of the forest, and turns over the dead leaves with its bill, like the pigeon, in search of the insects that may lie below.

Toward the last of October, as their food begins to fail, the woodcocks leave the interior, and move toward the sea, in preparation for their migration to the south. They take the journey in the evening, not in flocks, but following each other, in close succession, so as to make almost an unbroken line. They do not leave the coast, however, till winter begins. From August till their departure, they are in good order for the table, and are shot in great numbers by those who are versed in this kind of sporting. In Louisiana they are killed by men with torches, which the birds stand gazing upon, till the fowler knocks them down with a stick.

The Virginian Rail, *Rallus Virginianus*, spends the winter in the southern states, and returns to us in May. It hides in swamps and marshes, in the

day time, and only ventures abroad at night; but it feeds, both by night and day, on water insects, worms and seeds. It is extremely swift in running, and if pursued by a dog, will change its direction so often, rising on its wings at times, that he soon loses its track, as it escapes among the weeds. When on the wing, it can be shot, as it flies low and heavily, and only a short distance at a time. The nest is not easily found, being generally placed in a tuft, in soft meadows, where it is not easy for a man to go. It is a little raised, by means of the stalks of grasses, with a shallow cavity, lined with dry weeds, to contain the eggs. These are from four to seven in number, of a dusky white, with specks of brown red and pale purple, thickest toward the larger end. Dr. Brewer succeeded in finding one of these nests in a small meadow near Jamaica Plain, and within a few yards of the Providence rail-road.

The Sora Rail, *Rallus Carolinus*, which was formerly thought to follow the example of the swallow, and bury itself in the mud for the sake of passing the winter pleasantly, is a rare bird in Massachusetts. Birds of passage, on their way to their breeding places in the north, move on with very little delay; but on their return, having nothing but the fear of winter to hasten their motions, they linger till their instinct warns them that the last minute is come. It is, accordingly, in the autumn only, that this bird has been seen in our State. The same gentleman who ascertained that the former

species breeds here, suspects that the nests of the other rails will hereafter be found; they have been discovered on the borders of Lake Champlain and the North River.

The Yellow-breasted Rail, *Rallus Noveboracensis*, is also rare here, and in most parts of the United States. From May to September, it is found on the shores of Hudson's Bay, where it breeds; and on its return to winter quarters, probably takes an inland route, the greater proportion avoiding the Atlantic states. From Audubon, we learn that only a few, comparatively, go to the north; the great body remain in the extreme southern parts of the United States throughout the year.

The Purple Gallinule, *Gallinula Martinica*, and the Florida Gallinule, *G. galeata*, have already been mentioned as rare and accidental visiters in the State.

LOBE-FOOTED BIRDS.

The Cinereous Coot, *Fulica Americana*, is found in almost every part of North America, seeming to have little choice of climate or temperature, and to regulate its migrations by the scarcity or abundance of food. They appear among us in early autumn, and remain till November, when they leave us for the south by night. Their food consists of

seeds, grasses, worms, snails and insects, together with such small fish as they catch upon the edges of the water, to which they add a quanity of gravel and coarse sand. They are not seen to dive, except when wounded; then they make their way under water to the grass or reeds, and then swim for the nearest shore, where, notwithstanding the awkward appearance of their legs and feet, they walk with firmness, and run, if necessary, with great expedition. They probably breed in the State occasionally; Nuttall mentions that a pair took up their residence in Fresh pond in April, and in June were seen accompanied by their young; but their nests and eggs have not been found in this, nor, I believe, in any of the states of the Union.

The Red Phalarope, *Phalaropus fulicarius*, visits us on its return from the north in autumn; but they are seldom seen in Massachusetts. Audubon mentions that once, when sailing in a packet sixty miles from Nantucket, the vessel encountered a bed of seaweeds and froth, on which were hundreds of red phalaropes, walking with as much ease and confidence as if on shore.

The Hyperborean Phalarope, *Phalaropus hyperboraeus*, is, as its name implies, a northern bird, seldom seen farther south than New York. Dr. Brewer tells me that he has procured them here in May, but they are more abundant toward the Bay of Fundy. None are seen in the interior; and they are found in the greatest numbers on the banks

of seaweed, floating on the ocean, at great distances from the shore.

Wilson's Phalarope, *Phalaropus Wilsonii*, is a rare visiter, which, Dr. Brewer tells me, I may insert on the authority of Audubon, who has found it in various places along the eastern coast, from Boston to New Jersey; but it is not sufficiently common to have its history well understood.

The Crested Grebe, *Podiceps cristatus*, is a bird which breeds in the fur countries, and is seen here late in the season, on its return to the south; but while some proceed by the coast, more seem to follow the course of the great rivers, since they are seen in great numbers in the western states, flying at all hours of the day. From their alertness in diving, by which they often elude the aim of the fowler, they are called Dippers; when pursued, they keep only the bill above water; and Audubon says that they are easily caught when in ponds, by hooks placed on lines near the ground.

The Red-necked Grebe, *Podiceps rubricollis*, is found along the coast from New York to Maine, in winter. In the fur countries, they are common in the breeding season. Dr. Brewer tells me that he has procured them here in the winter, which, unlike the former, they spend in the eastern states.

The Horned Grebe, *Podiceps cornutus*, returns from the north in October, when it is seen in Mas-

sachusetts. Dr. Brewer classes it with those that spend the winter here; but the greater proportion must go on, since they are common at that season, on the southern inlets and rivers. While here, they keep in the salt water, diving with great celerity, and soon becoming so familiar with the gun, as to hide under water whenever they hear it. Nuttall mentions that the stomach of those which he has opened has generally contained quantities of their own feathers, plucked from the breast and swallowed. Audubon says the stomach contains hair-like substances rolled together like the pellets of owls; particulars which require more explanation than our present acquaintance with their habits enables any naturalist to give.

The Pied-billed Grebe, or Dobchick, *Podiceps Carolinensis*, comes to us from the north early in autumn, and remains till the approach of winter. Those found here are generally young. Their food consists of plants, seeds, water insects and small fish, together with which they swallow gravel. In the gizzards of some which Audubon examined, he found collections like those just mentioned, which consisted of the down of thistles and other plants, which had been swallowed together with the seed. These birds dive with great quickness, and use their wings under water; they sink so gently as to leave no ripple showing where they went down, nothing but the small end of the bill remains above, and this easily escapes observation, particularly among

the bulrushes, to which they resort when alarmed. Nothing was known of their nests, till Audubon found one near the banks of the Wabash river. None have ever been found in this State.

WEB-FOOTED BIRDS.

The Cayenne Tern, *Sterna Cayana*, is common at the south, where it breeds. Audubon also found it breeding at Labrador; so that, although none have yet been seen here, they must pass by us, and will probably be found to touch upon the coast of our State.

The Common Tern, *Sterna hirundo*, is common on our coast, where it bears the name of Mackerel Gull, from its being supposed to announce the arrival of that fish in its summer quarters. In May, they prepare, if it can be called preparing, a nest on some rocky islet or sand bar, where their eggs, are laid, with only a little sand scraped up to keep them in place; and in all pleasant days, are left to be warmed by the sun, the female sitting only at night and in foul weather. The eggs are of dull yellowish olive, with dark brown specks and blotches. The parents, though they appear so careless of their domestic establishment, watch over it with anxious vigilance, and are very bold in resisting intrusion. They breed at Egg rock, near Nahant. When the

young are first hatched, they tear fish in pieces to feed them; afterwards they drop the fish among them, where it is seized by the strongest; but they find other resources in the insects which they collect for themselves, rambling near the spot, but always attending to the voice of the old bird, when it warns them that danger is nigh. In winter they migrate to warmer regions.

The Roseate Tern, *Sterna Dougalli*, has received its popular name from the color of the breast, which, however, soon fades after death. Audubon found them in great numbers, breeding, on the Keys of Florida, and Nuttall procured one specimen at Chelsea Beach. Its eastern visit was probably accidental.

The Silvery Tern, *Sterna minuta*, the same with the Lesser Tern of Wilson, comes to us in the spring, later than the preceding. It is not uncommon on our shores, where it is seen dashing into the water, like a little fish-hawk, to secure its prey, or chasing insects over the pools and marshes. It sometimes goes into the interior, and has been found at a great distance from the sea. They are generally careless and unsuspicious, and pay little regard to an observer.

Bonaparte's Gull, *Larus Bonapartii*, is seen occasionally, early in autumn, on the coast of this State, and its whistling is heard in the air, as it proceeds to the south or inland, to feed.

The Kittiwake Gull, *Larus tridactylus*, is common along the coast, from New York to Eastport, though never seen in the interior. Audubon found it in great abundance on some of the islands in Boston harbor. In the air, its motions are light, bold and graceful, sweeping in broad circles at an immense height in the air, then stooping downwards to rest upon the waves. It is so awkward on the ground, that it can hardly walk; and it gathers its food, even the shell-fish from the sands, while on the wing.

The Common Gull, *Larus zonorhyncus*, is quite abundant on our coast, but it understands the danger of too near approach to man, and keeps, as much as possible, out of his reach. It floats gracefully in the air, till something attracts its attention, when it descends in a spiral curve, and seizing a fish, flies off, alights, and swallows it at leisure. When satisfied with food, they rest themselves by swimming in parties on the waves, their white plumage contrasting strongly with the deep green of the sea. When spring has commenced, the gulls assemble in flocks, on flats and beaches, and when paired, fly off to their breeding places, which Audubon found in great numbers in Labrador, and the eastern part of Maine. Part of their food consists of shell-fish, which, being unable otherwise to break the shell, they are said to carry high into the air, and to let fall on the rocks below.

The Silvery Gull, *Larus fuscus*, is found on

our coasts in winter, and is said to breed, both in the northern regions, and in islands near South Carolina.

The Herring Gull, *Larus argentatus*, is, according to Dr. Brewer, the most common species in the State. Audubon found them breeding at an island in the Bay of Fundy, where he was assured that, formerly, all made their nests, like other seabirds, on the ground; but finding that they were often disturbed by intrusive visiters, they had, many of them, adopted the practice of building in trees, a reach of sagacity one would hardly have expected from such a quarter. The younger ones still build on the earth; but, while those which are hatched below run about in a few days, those which are in the trees, do not undertake to leave their nests till they are able to fly. The same distinguished ornithologist saw one of these birds which had taken a very hard shell-fish, carry it into the air and let it fall without effect; it tried the experiment again, and yet a third time, when it succeeded; the gull, after each failure, carrying it higher than before. Much of their food consists of herrings, which they catch by following the shoals; they sometimes feed on small birds, and suck all the eggs they can find.

The White-winged Gull, *Larus leucopterus*, is inserted on the authority of Dr. Brewer, who has obtained it near Boston. It is not found farther south than New York. Its flight resembles that of

the preceding species, but it differs from it in size and markings, as well as in its greater fearlessness of man. It breeds in the high northern regions.

The Black-backed Gull, *Larus marinus*, is inserted on the authority of the gentleman just mentioned, who has found it in Boston harbor. It is a large and powerful bird, and, though shy and timid towards man, is very oppressive to other sea-birds. It devours voraciously all sorts of food except vegetables, even in the last stages of decay, but young birds and fish are its favorite food. The fish are caught as it flies, and, if not too large, swallowed without suspending its flight. It makes great consternation among the sea-fowl, by sucking their eggs, without regard to the remonstrances of the owners. When young ducks are on the water, they seize them, none except the eider having courage to resist; they sometimes plunge after fish in a considerable depth of water, but have no facility in diving. These birds, powerful as their flight is, do not go very far to the north to breed, nor are their breeding places found more toward the south than the eastern extremity of Maine. They do not go into the interior, except on the great lakes; they appear to rejoice in the storms of the ocean, having power to force their way against the heaviest wind.

The Skua Gull, *Lestris catarractes*, called by Linnæus the cataract jager, from the manner in which it darts down upon its prey, is a bird belonging to high northern latitudes, but in the depth of

winter it comes as far south as Massachusetts. It is a strong and daring bird, and though considerably less in size than the preceding, readily attacks and puts him to flight. If its nest is disturbed, it is completely insensible to danger, and gives battle at once, not only to all other animals, but even to man. Having all the rapacious habits of the gulls, with all this strength and courage, it is considered by other birds as the pirate of the shores.

Richardson's Jager, *Lestris Richardsonii*, visits the coast of Massachusetts and Maine, in the winter season, when it is seen on the inland bays about Boston, flying in pairs, or sitting on the water. Its flight is firm and long continued, and it takes advantage of it to pursue other sea-birds, and force them to disgorge their prey. It breeds in the fur countries, but, respecting its habits at that season, very little is known. Audubon has doubts whether it is a distinct species from the one which follows.

The Arctic Jager, *Lestris parasiticus*, inhabits the northern sea shores in summer, and in winter is found in Florida. It resembles the preceding in its habits of plundering other birds of the fruit of their labors. By means of its long tail, it can suddenly check its flight or change its direction, so that the victims of its oppression cannot escape its pursuit.

The Pomarine Jager, *Lestris pomarinus*, is a bird which Audubon never had the opportunity of examining till he went to Labrador, but Dr. Brewer

has obtained it in Massachusetts bay, and thus authorized us to claim it as a visiter of the State. So far as its habits are ascertained, they are like those of other gulls, but its history is very imperfectly known.

The Stormy Petrel, *Thalassidroma Wilsonii*, is found on almost all the Atlantic, and known to seamen, who look upon it with very little affection, by the name of Mother Carey's chicken. It follows the vessel in its course through the deep, not caring whither it goes, and when the tempest rises, seems so indifferent to its raging, or rather to enjoy it so much, that the superstitious formerly believed that this harmless bird had some agency in raising the storms. It is called the Petrel, from its walking, like the apostle Peter, on the surface of the water, where it gathers any food that may be thrown from the vessel which it pursues. After it grows dark, it rests on the water for the night; but on the following morning, easily overtakes the vessel that has left it behind. In general it is rather silent, but at times it makes a low sound, as if asking the seaman to throw it out some food. It usually subsists on resources supplied by its favorite element, the sea.

The Fork-tailed Petrel, *Thalassidroma Leachii*, was said by Bonaparte, to be uncommon on the American shores; but Audubon declares that on the coast of Massachusetts, this is much more abundant than the other species. On approaching land, when returning from Europe, he shot a number of those

that surrounded the vessel, and found among them specimens of all the three. This is the most suspicious, never flying close to the vessel like the others; it is not known to alight on the rigging, and rests less frequently upon the water. But its food is the same, consisting of such small fish and crustacea as it can pick up from floating seaweed on the water, or oily substances thrown from vessels into the sea. These birds are able to bear considerable abstinence, but everything which they swallow, seems to be turned to oil, and their flesh is rank and unpleasant to the taste. They are found breeding in the fissures of rocks, above the reach of the spray, while the preceding burrows in the sand on low islands. Though this bird seems so bound to the ocean, by all its habits and wants, I have had one brought to me which was taken near Chicopee river in Springfield, seventy miles from the shore.

The FULMAR PETREL, *Procellaria glacialis*, has been found by Audubon from Long Island to Newfoundland, but I do not know that any one has, as yet, been taken within the State. This is the bird so well known as the main dependence of the singular inhabitants of St. Kilda, one of the western isles of Scotland.

The SNOW GOOSE, *Anser hyperboreus*, breeds in Arctic America, resorting to the sandy shores of lakes and rivers. They are so cautious as to station one of their number as a sentinel, to warn them of approaching danger. They return with their families

in September, after which they are occasionally seen in Massachusetts bay. They are very noisy, and their note is distinguished from that of the common wild goose, by its greater shrillness. Their flesh is said to be better than that of the latter species. As the cold grows severe, they leave us for their winter quarters.

The Canada Goose, *Anser Canadensis*, is well known in Massachusetts, as one of the heralds of spring. Their spring migration appears always determined by the advance of the season, and the melting of the snow, which discloses a supply of grass and berries, uninjured by the frost, and ready as a resource for food. Their arrival is most welcome in the fur countries, where the aborigines depend upon them for their subsistence in summer. The hunter sets up stuffed birds as a decoy, and imitates their call; thus bringing them within his reach, he destroys them in great numbers. But while the great proportion go to the north to breed, Audubon assures us, that many remain and breed; some, he says, in pools in the eastern parts of Maine and Massachusetts, so that he thinks it entitled to be set down as a permanent resident within the Union. Farther north, they become more numerous, and in Labrador, their nests abound in every marshy plain.

When the young have become large, and sufficiently practised in flying, they prepare for their return. On the first appearance of snow, the ganders arrange the flocks in order of flight, the old males in front, the females next, and the young after them,

the weakest behind; and thus they set forth, sometimes with an extended front, sometimes in single file, but generally in a sharp angle, with an old gander at the head. When any one is fatigued, he falls back in the wake of another, who cleaves the air before him; the leader at times gives out a loud cry of encouragement, or command, which is answered from various parts of the line. They fly with great strength and steadiness, at a great height in the air, if they have far to go; but when doubtful of the season, they fly lower, and are often bewildered in fogs and snow storms, so as to come to the ground stupified, and to submit quietly to their fate. They are so much alive to changes of temperature, that, when they are seen returning over their line of march, it indicates that a change of weather is nigh.

When they alight in some place where they intend to pass the night, they crop the grass sidewise, like the domestic goose, or pat the ground with both feet to force the worms out of it. Sometimes they alight in corn-fields, where they do considerable damage; sometimes in the water, where they plunge their heads to the bottom in search of food. They always keep sentinels stationed, who, at the approach of cattle, are silent; but if a bear, or panther, or worse than all, a man comes nigh, the alarm is given, and all glide into the nearest water and swim to a distance from the shore. Their sense of hearing is wonderfully quick and discerning; they can at once distinguish a sound made by man.

The crossing of the breed of the wild with the

tame goose, as in the case of the turkey, has been attended with much advantage; the hybrid being larger and more easily fattened, brings a higher price than either of the species from which it is descended. The difficulty in the way of keeping the Canada goose, is, that it does not multiply as in the wild state; but, though it requires time to effect a considerable change in its habits, a persevering attempt at domestication would probably succeed. In some cases, it has succeeded already; but when flocks are passing over, it answers their call, and seems strongly tempted to return to the savage state.

The BARNACLE GOOSE, *Anser leucopsis*, is said by the gunners on the coast, to be shot in this State. Audubon never met with it. Nuttall speaks of it as a straggler on our coast.

HUTCHINS' GOOSE, *Anser Hutchinsii*, is inserted on the same authority. They call it the Flight, or Winter Goose. It resembles the common wild goose, except that it is less in size.

The BRANT GOOSE, *Anser bernicla*, a bird well known in our markets, breeds on the coasts of Hudson's Bay and the northern ocean, and spends the winter in the southern states. Early in October, they arrive in large numbers, some in order of march, others in noisy confusion, and make little more stay than is necessary for resting, after their long flight. But flocks continue to follow each other in long succession, and the gunners secure consid-

erable numbers. In spring they return, but their stay is still shorter, and their flesh very uninviting; in winter it is more valued, but has a fishy taste at best.

The SHOVELER, *Anas clypeata*, which is considered one of the greatest luxuries of the table, belongs to the northern part of the continent, but sometimes visits our coast, and still more frequently our lakes and rivers, in the declining year. Were it not for the great bill, this would be a handsome bird. It draws in the watery mud through the teeth of its bill, which fit into each other, forming a sort of sieve, by which it throws out the water, and retains the worms, seeds, and insects for its food. It is sometimes found in the Boston market, brought from the ponds in the vicinity.

The MALLARD DUCK, *Anas boschas*, is our common duck in its wild state. It is common at the south, but not so in Massachusetts, where it is very rare, and beyond Portland it is not known. The reason is, that this duck, instead of resorting to the seacoast, is partial to lakes and rivers. They are most abundant in the western states, where many of them remain, and breed. As they come from the great lakes, they spread themselves over those regions, resorting to meadows, swamps, and thick beech woods. In the wild state, they are strongly contrasted with the domesticated, in the spirit and animation of their movements; their flight is won-

derfully swift and well sustained, while the wings of the common duck hardly lift it from the ground. The squatters of the Mississippi catch many of the mallards when young, and they are sufficiently tame by the end of the first year. The young of those thus caught, are, for a year or two, superior to the wild ones, but soon become like the common ducks of the barnyard. The hybrids raised between the Mallard and Muscovy, are said to be large, and afford excellent eating.

The mallard has many of the properties of a nocturnal bird, feeding and travelling more by night than by day. In the dark, their flight is distinguished by the whistling of their wings. They generally arrange themselves in the wedge form to go to any distance, and never alight on any spot till they have wheeled several times round it, to ascertain whether it is safe to take possession; except when under the command of an experienced leader, who judges at once of the presence of danger, and if he suspects none, strikes down without hesitation upon the water. They then begin to bathe and dress themselves, before they go to the shore for food. After this ceremony is over, some explore the mud for leeches, frogs, or lizards; others go into the woods for beechnuts and acorns, moving round with prodigious cackling. If they hear a sound, they know whether it is made by animals or not; if it is, they go on with their employment; but if it denotes that man is at hand, they glide into the water, and put off to what they consider a safe distance from the shore.

The food of the mallard consists of small fish, snails, water insects and plants, in fact, hardly anything seems to come amiss. It delights in nuts and fruits, soon fattens on rice and other grain, and has an appetite for food which any other bird would regard as entirely uneatable. The young, when raised, thrive on chopped fish. The mallard has the habit of patting the ground with its feet to force worms out of their burrows.

The Grey Duck or Gadwale, *Anas strepera*, is an inhabitant of northern regions, and is believed to be rare in the United States. Wilson found it in New York and Kentucky, and some of the young birds are seen at times in the vicinity of Boston.

The Pintail Duck, *Anas acuta*, is very abundant in some of the western states, but seldom seen on the coast, and never farther eastward than Massachusetts. It breeds in the fur countries, but on its return, follows the coast of the great western rivers, and is so much a stranger to the coast, that it must be regarded as an inland bird. It arrives from the north in autumn, in good condition, and resorts to ponds and streams, where it feeds on tadpoles, leeches, and beechnuts, should they happen to abound. It is graceful in its motions on the water, and Audubon says that its notes are soft and pleasant, not resembling those of the mallard, to which they are often compared.

The American Widgeon, *Anas Americana*, breeds

in the fur countries, and, on its return, is found in most parts of the Union. About Chesapeake Bay, it is a companion rather than friend of the canvass-back, which dives for the plants on which it feeds. The widgeon, which likes the plant, but not the diving, watches the moment of the canvass-back's rising, and before its eyes are fairly opened, it snatches the plant from its mouth and makes off with it. The widgeon is found in the interior, as well as on the coast; many spend the winter in the southern states.

The Dusky Duck, *Anas obscura*, sometimes called the black duck, is, as Dr. Brewer informs me, the most common of all the species in the neighborhood of Boston. They are met with on the coast, from Florida to Labrador, but are not found in the high northern regions. They frequent salt marshes as well as inland waters, and their food consists of small shellfish and seeds. In the daytime, they are retired and shy; but on the report of a gun, they rise in great numbers and disperse in all directions. They fly high in calm weather, and low when the wind blows hard, when the gunners conceal themselves in the grass and shoot them down. Their flesh is said to be equal to that of the other ducks, when they have been well fed, but it generally has something of the flavor of its food. This bird breeds in this State in fresh water marshes and on sea islands; the eggs are eight or ten in number, resembling those of the domestic duck. Great numbers, however, proceed beyond our borders.

The Wood or Summer Duck, *Anas sponsa*, is a most beautiful bird, which makes its home in Massachusetts, in quiet retreats near ponds and rivers, where some of them spend the winter. They seldom visit the coast, but prefer the fresh water, their food consisting of grapes, beechnuts, acorns, and such berries as are found in the vicinity of ponds and streams. They also eat tadpoles and water insects, reaching their necks into the water to secure them, after the manner of the mallard. On the ground they run fast; they also move with firmness on the larger branches of trees. They swim and dive well, often stopping near the edge of the water, with nothing except the bill above; but often, when alarmed, they run into the depths of the wood. Their sense of hearing is very delicate, and aids them to escape from their various enemies. Their flight is rapid and graceful; they move through the trees and foliage as readily as the pigeon.

The wood ducks build in May, in the hollow part of a branch or the deserted hole of a large woodpecker, which they enter readily, though the entrance seems much smaller than their bodies. The eggs, which are from six to fifteen, of a yellowish green, are laid on dry plants, and down plucked from the parent's breast, together with the feathers of various other birds. As soon as the young are hatched, if the nest is over the water, they spread their little wings and feet, and drop into the stream; if not, the mother carries them carefully to the water, in her bill; sometimes she lets them fall on the dry leaves below, and then conducts them to

their favorite element, where they soon learn to collect flies, moschetoes, and other insects, for their food. The experiment of domesticating this fine bird has been tried with good success; and, after a few years, they would doubtless give up all desire to return to their wildness.

The Blue-winged Teal, *Anas discors*, returns early in autumn from the north and west, where it breeds. They are easily affected by the cold, and the first frosts are a signal to them to escape to warmer regions. They are found on our larger rivers, but seldom visit the sea.

The Green-winged Teal, *Anas crecca*, is more common in the southern states than here. Audubon did not find it in Newfoundland or Labrador; but there is reason to suppose that it breeds in the fur countries, and near the great lakes; those which are seen here, are said to be mostly females and young birds, the males pursuing a different route, and not appearing here till the spring. Being more select in feeding than most other ducks, they furnish an excellent article of food.

The Eider Duck, *Fuligula mollissima*, is well known as the bird which covers its eggs with down taken from its own breast. This is now become an important article of commerce, and the hunters, not satisfied with taking the down, carry away the eggs also. The female then lays a smaller number of eggs, and strips herself again to cover them. If the

nest is a second time robbed, the male bird supplies his down to cover the last laying; and thus it is, that many in civilized life feather their nests, at the expense of this plundered bird. Formerly they bred in considerable numbers, from Boston eastward; but they generally go farther north for that purpose, though in winter many of them are shot upon our coast. Audubon, while in Boston, had twenty-one specimens brought him, which two gunners had shot in a single day. The same high authority says that the eider would be domesticated with great ease, and would be invaluable on account of its down, its feathers, and its flesh for food.

The King Duck, *Fuligula spectabilis*, is an inhabitant of the northern regions, living, generally, and finding its food, out at sea. Covered with its coat of down, it braves the severity of the arctic season; but sometimes, in the depth of winter, wanders into our borders. It is said, by old gunners, that formerly they were not rare on our coast, and that they used to breed in company with the eiders. Now they are seldom found.

The Surf Duck, *Fuligula perspicillata*, breeds in Labrador and the regions of Hudson's Bay, and is seen, in spring, bending its course toward the north. On their return, some remain here through the winter; others extend their migrations as far as Florida. They feed principally in the sea; and also resort to shallows and beaches in search of small shell fish, for

which they are constantly diving. Their flesh is sometimes eaten, but is not recommended.

The Velvet Duck, *Fuligula fusca*, breeds in Labrador and the fur countries, and, after spending some time about the lakes in those regions, returns to the south, and reaches us in September. It is a sea bird in all its habits; but Nuttall has seen it in Fresh Pond, in Cambridge. After breeding near the fresh water lakes, it leaves them for the rest of the year, and prefers the shores, where its usual food, shell-fish and other articles which form the subsistence of sea-birds, always abounds. On the coast, it is called the White-winged Coot; its flesh, though no great luxury, is in considerable demand.

The American Scoter Duck, *Fuligula Americana*, comes to us from the shores of Hudson's Bay, and, while here, associates with the other sea ducks, living on similar food. Early in November, it is found in Boston market, and the flesh of the young is considered good.

The Ruddy Duck, *Fuligula rubida*, breeds in the small lakes of the fur countries, and returns to us in October, proceeding as far south as the limits of Florida. When it first arrives, the young are unsuspicious, but the old are difficult to approach. The females and young are seen in our ponds and about tide waters, and many of them are sold in Boston, under the name of Dun-Birds.

The Pied Duck, *Fuligula Labradora*, is thought, by Nuttall, to belong to the western part of the continent, and to be only found as a straggler on the Atlantic shores. It is called the Sand-shoal Duck, by the gunners of the middle states, from its resorting to sand bars in search of food. It is rarely found in this State, and only in winter or spring.

The Canvass-back Duck, *Fuligula valisneria*, so well known as a luxury of the table, never abounds in Massachusetts; some are seen in winter near Cohasset and Martha's Vineyard, and I learn from Mr. Cabot, that it has been shot in Fresh Pond. The great proportion, however, on returning from the fur countries, where they breed, establish themselves on Chesapeake Bay and the neighboring waters, and thence extend to the south; some having been seen, in winter, as far as New Orleans. The fresh water plant, *valisneria*, from which they are named, is their favorite food; it grows in long, narrow blades, with a white root, which is the part that they eat; they swim about the shoals where it grows, diving and tearing it up, not discouraged in consequence of the losses which they suffer from the dishonest arts of the widgeon. But where this plant is not found, they feed on the eel-grass, as it is called, which affords a subsistence to the canvass-back, and other birds of a similar description.

Though these birds, when they first arrive, are lean, in consequence of exhaustion, they are so diligent in collecting food that they soon are in order

for the table; and the gunner resorts to a thousand arts to secure them, which is not easy, since they are shy and watchful, and at night keep sentinels stationed to guard their slumbers. There seems to be no reason why they should not be domesticated, if those who make the attempt are sufficiently persevering. Their subsistence would be easily provided for, since they eat grain as readily as any other food.

The Red-headed Duck, *Fuligula ferina*, is the companion of the canvass-back, feeding on the stems of the same plant which the other gathers for the sake of the root, and so much resembling it, that it often has the honor of being substituted in the market, and sold for a similar price. They breed in the fur countries, and make their appearance here in October. Dr. Brewer tells me, that he has obtained these birds in our State. Mr. Rennie, in his late edition of Montague's British birds, says that he has one of them in his possession, which, as soon as it was caught, took to feeding on oats, and is perfectly tame and healthy, at the end of a confinement of three years.

The Scaup Duck, *Fuligula marila*, is said to breed in the fur countries, whence it returns at the approach of the cold season, and is found on our sea coast and the great western rivers. It is said to derive its name from feeding on scaup, or broken shell fish. Audubon says that he never found any portion of testaceous mollusca in those which he examined, though the birds might have found them in

abundance, had they desired them. They are common here in bays and fresh waters. They are easily domesticated, but their flesh is of no value for food. Audubon says that nothing but an epicure could eat them with satisfaction.

The Ring-necked Duck, *Fuligula rufitorques*, is found in autumn and winter on our Atlantic coast and our western waters. Its flesh is considered equal to that of any other duck, in tenderness and flavor. Dr. Richardson speaks of finding it in the fur countries, but gives no account of its nest. On its return from the north, it is spread over the whole extent of the Union; but much more abundant in some states than in others. Mr. Cabot obtained a specimen in Fresh Pond, and thus enabled us to add it to the list of Massachusetts birds.

The Golden Eye, *Fuligula clangula*, is an inhabitant of northern regions, which comes from the fur countries, where it breeds, and remains till it becomes difficult to obtain food. In the winter, they are not uncommon in the United States, but they return very early in the spring. While here, they are silent, and the name of Brass-eyed Whistler, which they sometimes bear, is given in consequence of the sound made by their wings. They fly well, but are so entirely made for the water, that they are hardly able to walk on the ground. Like most other birds of the class, they live partly on fish and insects, and partly on vegetable food. As game, they are considered good, though not of the first order.

The Buffel-headed or Spirit Duck, *Fuligula albeola*, was called, by the aborigines, by a name answering to *spirit*, because of the wonderful quickness with which it disappears at the twang of a bow, or the flash of a gun. It breeds in the fur countries, where it builds on hollow trees, in woods near the water, a situation favorable to the young, who move with difficulty on the ground. In autumn and winter they are found in almost all parts of the United States, sometimes on the coast, but more frequently on the inland waters. They are constantly engaged in diving for their food, and, when wounded with shot, disappear under water, so that it is very difficult to find them. By the last of April, most of them have returned to their northern home.

The Harlequin Duck, *Fuligula histrionica*, is a northern bird, which was found by Captain Ross in the highest latitudes which he visited. It is hardly ever found south of Boston, and is uncommon here, but I am assured by Dr. Brewer, that he has obtained it in our State. Audubon found it breeding along the coast of Labrador and Nova Scotia, where the male and female are called the Lord and Lady, probably in consequence of their beauty, and the ornaments on their breast. It is difficult to obtain, being anxiously watchful, and diving under water the moment it perceives the flash of the gun. Like other birds of this class, it provides for its security by stationing sentinels to sound an alarm on the approach of danger. The flesh is not much valued.

The Long-tailed Duck, *Fuligula glacialis*, is a resident in the north, where it associates with the eider and other ducks, and lingers as long as the cold leaves the waters open; but when the ice begins to form upon the Arctic seas, it migrates toward the south in search of food, and is then seen regularly and abundantly on the shores of Massachusetts; the young sometimes resorting to the fresh waters, while the old birds keep near the sea. They are lively and animated in their motions, and so noisy in conversation, that they are sometimes called old wives. They are expert in flying, diving and swimming; their food consists partly of the animal and partly of the vegetable productions of the sea. The caravans which pass along our coasts are large, and their noise can be heard at a great distance, kept up for hours in morning and evening, and also in calm, foggy weather. This bird is elegant in its appearance, but not held in much estimation as food. Its down is said to be equal to that of the eider, but the quantity is not so great.

The Goosander, *Mergus merganser*, is found in winter on the fresh lakes, rivers, and seacoast of the United States. They are seen here in small companies, continually diving in search of food. In April most of them disappear, and do not return till November. The extent of their breeding range is not known; but it is ascertained that some of the young are reared in Pennsylvania, and yet it is evident, from their habits, that the Arctic regions must be their more familiar home. Audubon describes

the goosander as breeding in Massachusetts, and entitled to be set down as a constant resident within our bounds.

The Red-breasted Merganser, *Mergus serrator*, is another resident in the north, which, when the waters there are sealed with ice, comes to the United States in search of food. Wilson speaks of it as brought to the Philadelphia market, from the banks of the Delaware, and as much more common than the preceding in the United States. Like the former, it has an extensive breeding range, its nests having been found in the rank weeds on the borders of lakes, in Maine and on Lake Michigan.

The Hooded Merganser, *Mergus cucullatus*, is a northern bird, found at the utmost limits of the fur countries, and one of the last to quit those desolate regions, when the frost makes it impossible for them to remain, by cutting off their supplies of food. In the winter, it ranges through the United States, and is found on the ocean and the inland waters. Some of them remain through the breeding season, and resort to the lakes, making nests of withered grass and feathers, on their grassy borders. These appear to be their favorite resorts, and those which frequent the seaside, do it from necessity rather than from choice. They are expert divers, and so quick in their motions, that they can take warning from the flash of the pan, in time to avoid the shot of the gunner; if they chance to be wounded, they escape under water, so that it is useless to

pursue them. Mr. Cabot and others have found this bird in our State.

The Cormorant, *Phalacrocorax carbo*, is abundant in winter on the islands near Boston and the coast of Massachusetts, where most of them remain in autumn, winter, and the early part of spring. Nuttall speaks of them as breeding on the islands, near the mouth of the harbor. They are never seen on fresh water, since they subsist entirely on fishes taken from the sea. In taking them, these birds are so expert, that a fish can hardly escape them; they swim under water with great rapidity, and almost always rise with their prey in their bill. If the fish is very large, they beat it to pieces on the shore; if they have caught it by the wrong end, they toss it in the air, and catch it by the head as it falls, so that the fins may present no obstacle to its passing down the throat. When thus employed, and when at rest, they are so constantly on their guard, that it is very difficult to approach them; and if the gunner has succeeded in wounding one, it is useless for him to pursue, since both old and young sail under water, using their wings to propel and their tails to steer them, as in the air. But their safety is provided for, without exertion on their part, since their flesh is so poor, tough and fishy that, Audubon says, not even epicures can eat them.

The Double-crested Cormorant, *Phalacrocorax dilophus*, which was first described by Richardson,

and has been considered extremely rare, has been obtained by Dr. Brewer, in the vicinity of Boston. They are found breeding on low islands at Labrador, in great numbers, arriving as soon as the ice is dissolved from the water in the spring. They spend the winter on the coast of the eastern states. At that season, not many are seen farther east than the Bay of Halifax. No fish comes amiss to their insatiable appetites; of codlings particularly, they destroy immense numbers. They differ from the Florida cormorant, described by Audubon, chiefly in their superior size, and having more of the long feathers behind the eye.

The Shag, *Phalacrocorax graculus*, is found in most parts of the United States as far south as Florida, where they breed in large associations. They appear to make the bays and islands of the St. Lawrence their northern bounds. In the high northern regions they have not yet been encountered. They live perpetually near the sea, never wandering inland like the common cormorant, which has been seen on the Missouri river. They are expert divers, and collect great quantities of fish. Near the mouth of Boston harbor, they are found in thick and numerous flocks, at the approach of winter.

The Gannet, *Sula bassana*, a bird known on both sides of the Atlantic, is added to this list on the authority of Dr. Brewer, who has obtained a specimen. In the summer, they are seen in vast numbers in the bay of St. Lawrence, where the Gannet

Rock, as it is called, a large rocky island, is entirely whitened with the plumage of the females on their nests, while the crowds hovering over and around it, appear like a driving snow storm. While thus engaged, they were easily approached, and were not alarmed even at the discharge of a gun, the meaning of which most sea-birds fully understand. They are seen on our eastern coasts in the autumn, and perhaps at other seasons of the year. They are not observed to dive on any alarm, nor for the sake of procuring food.

The Loon, or Great Northern Diver, *Colymbus glacialis*, is not an uncommon bird. It spends the breeding season in the fur countries, the British provinces, and probably in the most northern part of the states. On the approach of winter, they migrate, to escape the severity of the winter, most of their young going to the south; but some remaining in the vicinity of Chesapeake Bay. They are shy and watchful birds. They breed in the most retired places which they can find, in rocky islets or the borders of lakes; and as soon as the young are able to travel, the parent conducts them to the sea. They are active and unwearied in diving, and have the power of swimming under water almost as fast as they can fly in the air. In the day time they appear to dislike the bright sunshine, and are most active and animated at the approach of night. Their call is loud and dismal, particularly disagreeable to seamen, because it is thought to portend a storm;

it is so powerful that it can be distinctly heard, when the bird is so distant as to be almost invisible in the air. This bird is offered for sale in our markets; but its flesh is tough and unpalatable.

The Black-throated Diver, *Colymbus arcticus*, is, as its name denotes, a northern bird, and is more rare on our coast than the preceding; but I am assured, on the authority of Audubon, that it is sometimes seen in our State.

The Red-throated Diver, *Colymbus septentrionalis*, is found on the coast of the United States in autumn, winter, and, it may be said, in spring; though they retire to the north before the snows are gone. The old birds are rarely seen at the south of Boston bay; but the young, more affected by the cold, proceed as far as Maryland. Some of them breed at the Bay of Fundy, but they abound much more in Labrador, on the little lakes which are common in that wild country. They are at all times shy and watchful, alive to every danger, but particularly uneasy at the sight of man. When he appears, though at a great distance, they dive and swim under water to the farther part of the lake, but if he continues to approach, they rise from the water, instead of diving again like the loon. Their notes, uttered in rapid succession, are harsh and rather loud. Dr. Richardson says that they cover their eggs with down like the eider; but as this was not the case with those seen at Labrador, they probably

vary their practice according to the climate where they make their nests.

The Black Guillemot, *Uria grylle*, has been seen, in severe winters, as far south as Maryland; but is uncommon even as far south as Massachusetts. A specimen has been procured at Nahant, by Dr. Brewer; but they do not abound this side of the Bay of Fundy. At Labrador, they breed in large numbers. They are sea-birds in the fullest sense of the term, hardly ever going inland, except to breed; and they are so active and successful, in procuring food, that they can remain and thrive, when almost all other birds are driven, by the cold, from the northern seas. Like many other sea fowl, they show great sagacity in preparing a place for their nest. If the fissure in the rocks where they make it, is dry, they waste no labor upon it; but if it is likely that any water may run there, in the time of rain or dissolving snow, they raise it with pebbles to a sufficient height to keep their eggs from being injured. Is this instinct, or is it reason? Or, rather, who will point out the boundary that separates the two?

The Foolish Guillemot, *Uria troile*, so called, from its patience in submitting to evils which it cannot help, is a hardy inhabitant of northern regions. It is said to submit to be killed in the breeding season, without attempting to escape; but Audubon, who knows more of their habits than any one else, does not mention this circumstance in his interesting description. The folly of the guillemot seems

to consist in its returning to the breeding places where it is annually disturbed; but this appears to be done in despair of going beyond human reach; for it once bred in our bay. But it has for many years abandoned it, and proceeds to the north in company with the eiders, early in the spring. Their eggs afford luxurious food, and are collected in great numbers by those who make it their employment, to be sent to distant markets. They are so numerous, that the sailors, who were sent by Audubon to bring him two or three dozen, returned with twenty-five hundred, which indicates an immense abundance of the birds, since the eggs in each nest do not exceed three. The white line that encircles the eye and extends back upon the head, is found only in the old birds. Like the preceding species, they swim under water almost as rapidly as they can fly above.

The Large-billed Guillemot, *Uria Brunnichii*, is said, by Nuttall, to be occasionally found, in winter, on the coast of the northern states, but I cannot ascertain that any one has been taken in Massachusetts, except in a single instance; Dr. Brewer found one washed up on the beach, in April, 1836. This, however, is sufficient to give it a place among our birds. The specimen from which Audubon's illustration was taken, was sent him from Eastport in Maine. He found none on the coast of Labrador, though the preceding species, with which this associates, so greatly abounded. They had probably gone farther into their arctic home.

The LITTLE GUILLEMOT, *Uria alle*, sometimes called the Little Auk or Pigeon Diver, dwells far within the arctic circle, and was found by Dr. Richardson at Melville Island. In hardiness and power of enduring cold, no bird exceeds them; in the depth of winter, when the ice of the ocean is lifted and broken by storms, they are seen crowding to the fissures, to find a supply of food. They seem to delight in tempests, which, by agitating the waters, throw up in greater quantities the marine productions on which they depend for subsistence. In Newfoundland they are called the Ice-bird, from the presumption that, unless extreme cold were approaching, they would not come so far from home. Those that are found in this State are generally exhausted by their long flight; some have quietly submitted to be taken by the hand. They are not regular visitants, but occasional, solitary wanderers.

The PUFFIN, *Mormon arcticus*, commonly called the sea parrot, has been found in severe winters as far south as Savannah; but this is unusual; its common range is from Long Island to the Bay of Fundy, where many of them breed. Many more, however, keep on to Labrador, where Audubon found flocks, which covered the water to the extent of half an acre. Those which proceed to that distance, leave the states in April, and make their way along the shore, never going far from the sea. They breed in holes, which they make by burrowing three or four feet in the ground, and feed their young with small

fish. They are very social, and betray strong attachment to each other; when any one is shot, some one alights by its side, swimming round it and stirring it with its bill, as if urging it to fly or dive; and when man, the only animal savage enough to torture and kill for pleasure, lifts an oar, to knock it on the head, it reluctantly leaves its friend, and disappears under the water. The puffin flies firmly and swims rapidly under water; it also dives to the bottom, many fathoms deep, to find shell fish and other prey. In his contests with the piratical raven, the puffin grapples with his antagonist, and both fall into the water, when the raven is drowned; but if he can seize the puffin's neck, the victory inclines to the other side.

The Razor-billed Auk, *Alca torda*, occasionally goes as far south as New York, in winter; but farther south it is never seen. It is found from Boston eastward, arriving on the coast in November, and returning in April. While here, they are seen fishing far out at sea, and are thought to be able to dive deeper than even the puffin, in search of their food, which consists of shrimps, shell-fish, small fishes, and roe. They breed in the fissures of the rocky shores of Labrador, sometimes depositing their eggs where the water can run off without wetting them; but if there is danger that the water will touch the eggs, they are laid on pebbles, which are heaped by the bird, to let the moisture run below. The nests are very near each other; it is remarkable, that in the fissures and caverns, they sit flat upon

the egg like common birds; but in places more exposed, keep an upright position, with their faces toward the wind. In these places also they lay but one egg, while in places more sheltered, there are often two. The eggs are considered a great luxury; the flesh is said to be good to the taste, though dark and uninviting to the eye.

In the foregoing list of our water birds, I have given the names, with a short account of the habits of all which reside with us or visit us, so far as I have been able to ascertain them. Some, which occasionally visit us, may be omitted; and if not, succeeding observations will doubtless make a difference in the list; since the accident of a winter unusually severe, may bring some arctic birds farther south than they have yet been seen; and a similar cause may make us acquainted with some residents of the south, which have not yet entered our bounds. The range of breeding and migration is thus at times contracted or extended; but the visits of a stranger, few and far between, are of but little importance, and if our regular visitants and permanent residents are set down and properly described, it is hoped that the purpose of the survey will be answered.

It is more probable, on the other hand, that some birds which come to us regularly now, finding what sort of welcome awaits them, will gradually withdraw; for they are by no means slow to benefit

by experience; those which at first were tame and familiar, are many of them growing cautious and distrustful; the character of man stands in low estimation among them; and as they know him better, they go farther from his reach. Many birds which formerly raised their young in our State, now confine themselves to regions of greater security; the old gunners on our coast can give more than one history of such desertion; and in some cases, the loss has been severe. Thus, for example, the wild goose is believed to have once raised its young in the temperate climates of the United States. The early settlers on the Ohio, testify that they formerly abounded there at all seasons of the year; it was common, within the memory of man, to find the young birds on the ponds of Kentucky; but, like the deer and the grous, they have learned that the world is wide, and now, they find, in the quiet of the northern wilderness, a home, which has the great recommendation of being out of humanity's reach! The eider duck is another example. So lately as Wilson's time, the young were reared on our coast; but now, they have abandoned it; gaining nothing indeed by the exchange, since there is reason to believe that when it bred in this climate, it was not compelled to cover its eggs with the down which tempts so many adventurers to search for and rifle its nest.

I do not mean to say, that these desertions ought to be prevented. In some few instances, the experiment has been tried; but it is found, as might have been foreseen, that no human enactment can sus-

pend the operation of a law of nature. The statutes on that subject are generally inefficient; no one cares to execute them; the idlers in a community are a privileged order, who pay little reverence to the law, and the industrious, beside having other employment than to note down their neighbors' transgressions, cannot be persuaded that there is any crime in shooting a wild bird, still less that the act is harmless at one season of the year, and injurious at another. Nor is it by any means certain, that it would be desirable, even if it were possible, to prevent this extermination. It is better for the civilized community that the process should go on. The epicure may lose an indulgence, and his case will doubtless excite all the commiseration which it deserves; but it will be public gain, without question, to have the field and forest offer no bounty to idleness, tempting it away from the serious cares of life, to engage in pleasures, which no one is the better, in character, in habits, or in heart, for enjoying.

It is very desirable, that the experiment of domestication, which has been suggested once or twice in the preceding remarks, should be tried on a large scale; and it might be well if some inducement should be offered to tempt some competent persons to engage in such an undertaking. It cannot be despatched in a single season; it would require time to determine on what food, and under what circumstances, they would be likely to thrive best; and much more time would be necessary to

effect a permanent change in the habits of a wild and wandering race, and to overcome that impulse, which, in the season of migration, acts so powerfully upon them, that some imprisoned birds with their wings clipped, have been known to break from their enclosures, and to set out on foot, for the region of Hudson's Bay. In many cases, no doubt, such attempts would succeed without difficulty; and in others, what could not be done by a short experiment, might be accomplished by successive and persevering trials; valuable accessions might thus be made to the number of our domestic birds; many might come into general use, which now only the sportsman and the epicure can enjoy, and races of wild birds be preserved, which will otherwise, in spite of all our game laws, soon disappear, and be lost from our forests and shores.

WILLIAM B. O. PEABODY.

SUPPLEMENT

TO THE

ICHTHYOLOGICAL REPORT.

Since the report on the Fishes has passed through the press, I have had an opportunity, by the politeness of Mr. John S. Sleeper, Editor of the "Mercantile Journal," of examining a specimen of the "*Lophius piscatorius*," Sea-Devil; and as the account embodied in my report was extracted from Yarrell's "British Fishes," I would present a description here from a recent specimen, that the ichthyologist may judge for himself, as to my correctness in considering our fish the same as the foreign species.

Length of the specimen before me, two feet and one inch; width across, in front of the pectorals, one foot; length of the head, from the tip of the snout to the occiput, six inches. All the upper part of the body is of a dark brown color, caused by very minute irregular markings; body beneath, white. Numerous fleshy cirrhi beneath the lower jaw, edging it to the angles; beyond these, they are continued to the pectoral fins, and back of them, they are again continued to the tail; these cirrhi are beneath the jaw, nearly an inch in length; on the sides of the body they are much smaller. The vertical gape of the mouth, when expanded, is five inches; the dis-

tance across, from angle to angle of the upper jaw, eight inches; the tip of the lower jaw projects nearly two inches in front of the upper. The intermaxillary bones are capable of being protruded nearly an inch beyond the maxillaries, and are armed with a single row of small pointed teeth upon each side, and two rows of much larger teeth in their centre; one of these rows upon the edge, the other, within and beneath, very incurved; upon the upper jaw, at its tip, is a space of one and a half inches, destitute of teeth; on each side of this space, is one quite large tooth, and a second, much smaller; about half an inch outside of these, a single row of eight or ten teeth, the three or four first of which, are much the largest. On each side of the pharynx, are three rows of sharp incurved teeth, about a line in length, resembling spines; these rows are arranged directly above each other, and are double. The lower jaw has a single row of numerous, very sharp teeth, some of them half an inch long; the tongue has a broad, bony, triangular plate, upon each side, armed with two rows of teeth on each side, which are turned toward the throat. The distance from the margin of the upper jaw to the eye, is equal to the distance between the eyes. Several spines are observable upon the head; two just back of the snout, on each side; a bifurcated one over the middle of the eye, and another similar one at its posterior angle; a small one in a line back of these, at the posterior portion of the head. A spine pointing forward, is situated at the angle of the jaws, and three straight spines are seen back of this. The eyes are nearly

circular, half an inch in diameter; the pupils, black; the irides, yellowish brown, with darker rays. One inch back of the snout, are two elongated tentacula, four inches long, of the firmness of bristles, with the extremities free; as the tentacula are lying down, directly at their posterior extremities, is situated a third, two inches in length, with about half of its extent only naked; these tentacula are capable of being elevated at the pleasure of the animal.

The first Dorsal is situated an inch and a half back of this third tentaculum; it is composed of *three* small rays, connected by a dark colored membrane.

The second Dorsal is two and a half inches back of the first; it is composed of *eleven* rays; this fin is six inches long, three and a quarter inches high at its commencement, and two inches high at its posterior extremity.

The Pectoral fins are three inches long; quadrate; rather higher than long; slightly digitated at their extremities, and ciliated; width at the extremity, when expanded, six inches; composed of *twenty-five* rays.

The Ventral fins, one inch long, two inches high; having *five* strongly marked digitations.

The Anal fin is five inches long; as high again at its posterior extremity as at its anterior; it is composed of *nine* rays.

The Caudal fin is two inches long, four and a half inches high, and is composed of eight rays.

Squalus. Lin. (*Selache.* Cuv.) *elephas.* Le Sueur.

Journal Academy Natural Sciences, et fig.

Two or three weeks since, a large male shark was harpooned in the harbor of Provincetown, and being towed to Chelsea, was there exhibited. When I saw it, it was lying upon the beach, where it was entirely exposed at low tide, and nearly, if not altogether covered by water when the tide was high; the tide was flowing in, when I examined it, which compelled me to make a more rapid survey than could have been wished. It had been opened, and its viscera were removed. The *liver* filled eight barrels, and furnished six barrels of oil. The fish presented the following appearances:

Its entire length was thirty feet three inches. The whole upper part of the body, was of a dark slate color; lighter beneath. The skin was divided into innumerable rugæ, which were covered with minute sharp points, often collected into groups, resembling the discs of many of the "*Echini,*" upon which are situated the spines by which they are ornamented; or, still more, the tubercles arranged along the lateral line of some of our "*Cotti,*" causing the skin to be exceedingly rough. *Head,* small; perfectly smooth, for the most part, in front of the eyes, and covered with circular and oblong mucous pores, which keep this portion constantly lubricated. Snout, blunt. *Nostrils,* five inches in front of the eyes, their lower portion upon the edge of the upper lip. *Eyes,* very small; diameter of the eye,

three inches; largest circumference of the *sclerotic coat,* when removed from the socket, eight and a half inches. Eyes very moveable in their orbits; distance between the eyes, two feet; distance between the tip of the jaws, as artificially raised, two feet; this vertical gap is undoubtedly as much again, *at least,* in the living fish, which gives us an opening of four feet. Mouth white, mottled with fuliginous. Jaws, furnished with a great number of small, incurved, pointed teeth. Six rows of these in the upper jaw, and seven rows in the lower jaw; the inner row in this jaw, are hardly formed; each of the rows in this jaw, as I counted them in the mouth, contained one hundred teeth, from the tip of the jaw to the angle of the jaw, or two hundred, as counted from one angle to the opposite one, or in a word, *fourteen hundred teeth* in this jaw. The teeth are conical, sharp, polished, with a sensible ridge upon each side, often roughened, almost serrated; the lower portion of the tooth, striated; one of the teeth in this jaw is bifid; the teeth at the angles of the jaws, short and more compressed. The teeth in the centre of the jaw, are three lines high above the jaw, and their base, or root, about the same length within the socket. *Temporal orifices,* small, just back of the angle of the jaw.

From the tip of the snout to the first branchia, four feet nine inches. Five very large branchiæ, nearly surrounding the head, as the animal was lying; by measurement, the first pair of branchiæ were separated, on the neck, from each other, six inches; the second pair were separated, at the same

situation, nine inches; the third pair, one foot three inches; the fourth pair, one foot nine inches; the fifth pair, two feet three inches; showing the first to be much the largest. The first Dorsal fin is triangular: two feet ten inches long, four feet four inches high, anteriorly, three feet posteriorly; distance between the first and second dorsal, six feet; second dorsal ten inches long, sixteen high anteriorly, thirteen posteriorly. *Pectorals*, falciform; one foot nine inches long; five and a half feet high; distance between the pectoral and ventral, eight feet. Length of the *ventrals*, one foot eleven inches; height, two feet nine inches; length of the claspers, three feet three inches; width at their base, eight inches, from which they gradually pass to a point; they enclose a strong, bony spine. The commencement of the anal is directly opposite the middle of the second dorsal; its length is eleven inches; its height, fourteen inches; across the top, ten inches; distance between the anus and anal fin, three and a half feet. Anterior to the caudal fin is a lunated depression above and beneath the posterior extremity of the fish; at the base of the tail, a carina upon each side, one foot eight inches long. The caudal lobes, unequal; the upper lobe, six feet six inches in length, measured over its curve, having at its extremity a small triangular lobe; the lower lobe, four feet two inches, measured in the same way; width of the extremity of the *lower lobe*, six inches; width at the base, two feet two inches; width of the extremity of the *upper fluke*, or lobe, one inch; width of the base, two feet three

and a half inches; from the lunated depression to the middle of the fin, two feet eleven inches.

Attached to the branchiæ, I found a single specimen of the "*Cineras vittata.*"

Under the name of "*squalus elephas,*" this shark was admirably described by Le Sueur, in the "*Journal of the Academy of Natural Sciences,*" from a specimen taken on the coast of New Jersey in 1822; and his figure, when it is remembered that it was taken from a stuffed skin, is very accurate.

Among our fishermen it is known as the *bone shark.*

D. H. S.

ART. III.—DESCRIPTIONS OF FOUR NEW SPECIES OF FISHES.

By JARED P. KIRTLAND, M. D.; first Assistant in the Geological Board of Ohio, and Prof. of the T. and Pract. of Med. in the Med. College of Ohio, at Cincinnati. Communicated Sept. 1838.

GASTEROSTEUS INCONSTANS. *Variable Stickleback.*

Plate II. fig. 1.

Head elongated; mouth small, armed with numerous teeth. *Lower lip* projecting. *Eyes* large and prominent. *Nostrils* midway between the upper lip and eyes.

Body slightly compressed, scaleless. Back armed with five or six falcated, moveable spines, each with a decurrent membrane attached to its lower half posteriorly.

Dorsal fin 9 to 12 rayed, gradually sloping behind to the back. *Caudal fin* circular, truncated

posteriorly. *Anal fin*, one spinous ray, and from 9 to 12 soft rays. *Ventral fin* a spine. *Pectoral fins* oval, covering, when expanded, a circular, *unserrated* plate.

Color. Back, olive or black; sides, faintly maculated with olive; a black or fuscous zone often extends along the medial line. Throat and abdomen yellowish or white.

Length, one and a half inch.

Habitat. Common in ditches and muddy pools in Trumbull Co. Ohio.

Observations. It is easily distinguished from all the other species of this genus by its size, color, form of its plates, and number of dorsal spines. The latter, as well as the number of rays in the dorsal and anal fins, vary in different specimens; hence I adopted the above specific name.

Etheostoma variata. *Variegated Etheostome, or Darter.*

Plate II. fig. 2.

Head conical, gibbous; *orbits* prominent; *eyes* large; iris dark olive. *Nostrils* deep and large, anterior to the eyes. *Operculum* complex, many folded, terminating behind in a spine.

Body cylindric, hardly compressed except at the tail; *back* gibbous; *abdomen* rectilinear; *scales* rough, apparently hexagonal.

Pectoral fins large, elongated almost to the origin of the anal fin. *Ventral fins* beneath the pectoral,

falcated. *Anal fin* quadrangular. *Caudal fin* fan-shaped. *Anterior dorsal* spinous, 12 rayed. *Posterior dorsal,* soft, 13 rayed.

Colors gaudy. Anterior dorsal fin edged with orange, and banded through its middle with indigo. Post dorsal fuscous, touched with orange or vermillion. Anal fin verditer. Body banded behind the pectoral fins with seven or eight white zones, spotted with orange, the intervening spaces green; an orange stripe beneath the pectoral fins, on the sides of the abdomen. Back and head, olive and green.

Length, three inches.

Habitat. Mahoning river, a tributary of the Big Bear and Ohio. Like the other species of this genus its place of retreat is beneath logs and stones. It prefers rapid and clear water.

Observations. This is one of the most brilliant colored of the western fishes. It is frequently taken by fishermen for bait, and preferred to the common minnows. Rafinesque established a new genus for the reception of a family of fishes very common in the waters of Lake Erie and the Ohio river, but so small in size as to attract little attention. The habits of all the species are very similar. They may be seen, when the water is clear, moving slowly along the sides of logs and stones; but if they are disturbed, they will dart away with great rapidity. Two of the largest species readily bite at a hook.

As there cannot be a more natural generic assemblage of fish than four of the species described by the above named author, and the two I have noticed,

his arrangement will probably stand. One of his species, the *E. calliura*, is no other than the young of the Cichla Ohioensis of Le Sueur. That fish assumes a variety of appearances at different ages.

ETHEOSTOMA MACULATA. *Black Darter, or speckled Hog-fish.*

Plate II. fig. 3.

Head narrow, compressed; *nose* acute; *operculum* scaly, double spined posteriorly; *jaws* equal; *mouth* small, longitudinal.

Body flattish, tapering gradually from the ventral fin to the caudal.

Dorsal fins, anterior, spinous, 10 rayed; *posterior,* soft, 13 rayed, connected with the anterior by an intervening, decurrent membrane. *Caudal fin,* 22 rayed, circular, truncate posteriorly. *Anal fin* quadrangular, 1 spinous, 7 soft rays. *Ventral fin,* 1 spinous, 5 soft rays. *Pectoral fins* abbreviated, 14 rayed.

Length, two and a half inches.

Color. Back and *head, olive* and *black;* sides and abdomen, sea-green, with from twelve to twenty carmine dots near the medial line.

Habitat. Mahoning river, in rapid water. Very rare.

OBSERVATIONS. This species is readily distinguished by its flat, compressed body, peculiar color, and especially its beautiful carmine maculations. It exceeds in beauty the speckled trout.

Hydargira limi.

Plate II. fig. 4.

Head, conic-cylindrical, smooth; *upper jaw* slightly recurved near the end; *lower jaw* more prominent; *mouth* somewhat diagonal; *operculum* with a membranous edge, extending to the origin of the pectoral fin.

Body, uniformly cylindric, fusiform, slightly compressed behind the dorsal and anal fins; destitute of any prominent marking. *Back,* gibbous; *abdomen,* rectilinear.

Dorsal fin quadrangular, oblong, twice the length of the anal fin, 13 rayed, each minutely dotted, or lineated transversely. *Caudal fin* circular, diaphanous, 14 rayed, each ray transversely and minutely lineated. *Anal fin* 10 rayed, situated beneath the posterior half of the dorsal. *Ventral fin* small, acute, extremity reaching the vent. *Pectoral fins* oval, origin oblique.

Scales rather large, sub-rhomboidal.

Color. Dark olive, irregularly waved with fuscous; abdomen free from the olive; an irregular transverse black band on the body, near the base of the caudal fin.

Length, from two to three inches.

Observations. I have met with this species only in the heads of Yellow Creek, in the village of Poland, Trumbull Co., Ohio. It uniformly dwells in soft mud, and is sometimes found in great numbers in excavating springs and ditches. Like the other members of this genus, it is very tenacious of life.

ART. IV.—DESCRIPTIONS OF THREE NEW SPECIES OF SHELLS. By JOHN G. ANTHONY. Communicated January and July, 1839.

ANCULOTUS COSTATUS.

Plate III. fig. 1.

Shell subglobose, with a depressed convex spire; body whorl ventricose, with about five costæ revolving around it; color olivaceous; aperture obovate; base regularly rounded; purplish within.

Found on pebbly shores near the city of Cincinnati.

HELIX STRIATELLA.

Plate III. fig. 2.

Shell remarkably thin, somewhat depressed; of a very delicate horn color, transparent; whorls four, very finely striated transversely; spire scarcely elevated; suture moderate; aperture nearly round; labrum not reflected nor thickened. Umbilicus not remarkably large, in diameter not equal to the body whorl; transverse diameter one fifth of an inch.

Found abundantly near Cincinnati, in low bottom-lands near the margins of running streams.

From "*Helix perspectiva*," Say, which it most nearly resembles, it may be readily distinguished by its less number of volutions, its exceedingly delicate striæ, and its invariably smaller size. The color is also much lighter, and its whole appearance far more

delicate than the "*perspectiva.*" I have never found it upon rotten wood, nor under the bark of old logs, the common habitat of the "*perspectiva.*"

Paludina Cincinnatiensis.

Plate III. fig. 3.

Shell somewhat ventricose, subumbilicate, color delicate green. Whorls four, smooth; spire entire at the apex and prominent; suture deeply impressed; aperture much dilated, approaching to orbicular, nearly half the length of the shell; length one fifth of an inch.

Found in the canal near Cincinnati, clinging to small stones.

ARTICLE V.—NOTICE OF NATIVE NITRATE OF SODA, CONTAINING SULPHATE OF SODA, CHLORIDE OF SODIUM, IODATE OF SODA, AND CHLORIODIDE OF SODIUM, from the Province of Tarapaca, Pampa of Tamarugal, in South Peru; and of ALGOROBA WOOD, from the buried forests beneath the Pampa of Tamarugal. By A. A. Hayes, M. D. From a letter to M. Gay, M. D. Curator of Mineralogy and Geology in the Society.

In presenting these specimens for the Cabinet of the Society, I wish to make the first public announcement of the discovery of Iodate of Soda, as a new mineral species.

The nitrate of soda, as the source from which the refined nitrate of soda of commerce is obtained, is an important and valuable salt, in an economical point of view. In the province of Tarapaca, it occurs mixed with more or less of the sulphate of soda

and chloride of sodium, in large beds, exposed on their upper surfaces freely to the air. The whole surface of the pampa is made up of saline matter, mixed with sand composed of water worn shells and detritus of trachytic rocks, presenting an area of many square miles of variable depth. Below the surface, in several places, is found the fossil wood, the trees being entire, and generally inclined toward the southwest. Numerous volcanoes exist in the Andes, between which and the pampa a range of low hills intervenes, marking apparently the border of the surface, once covered by a lake. These specimens were obtained by Mr. John H. Blake, of Boston, to whom I am indebted for a description of the locality, which will soon be published.

Roxbury Laboratory, 17*th July*, 1838.

EXTRACT FROM THE LETTER.

"The nitrate of soda contains a salt of chlorine and iodine united. This is proved by moistening a few grains of the *yellow* part of a mass with water, and rubbing it on starch paper; if free iodine were present, a purple or blue color would be produced. Weak sulphuric acid, added to the moistened mass, gives it the power of thus altering the starch, and, as bromine is not present, no other known body can produce that effect. If such a mixture be distilled, chloride of iodine passes over into the recipient. That iodate of soda is present, is proved by the fact, that the saline matter, which is mixed with the nitrate of soda, contains a salt of sparing solubility in water, which does not give any traces of iodine when mixed with a solution of chlorine, in a solution of starch in sulphuric acid. When heated with carbon, it deflagrates feebly, and the residue, dissolved in water, instantly renders a solution of starch in sulphuric acid blue, if chlorine is present. Magnesia is always present in the specimens."

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ART. VI.—A FURTHER ENUMERATION OF SOME NEW ENGLAND LICHENES.* By Edward Tuckerman, Jun., LL. B., a Member of the Society. (Read before the Society, in March, 1840.)

Arthonia. A genus proposed by Acharius in his Lichenogr. Univ., and adopted, to some extent, by later writers. Sprengel, however, refers all the species to the genus Graphis, as arranged by him. Arthonia *punctiformis*, Ach. Lich. Univ., Schær.! Lich. Helvet., Muhl. Catal., Torr. Catal., Hals. Syn. View, Mass. Catal., is a common and well known form, occurring on smooth bark, and much resembling, at sight, some of the minute Verrucariæ. This seems, in some respects, to differ from Opegrapha of Acharius, but the following it seems to me much more difficult to separate from that genus. A. *radiata*, *β. astroidea*, Ach. l. c., Moug. & Nestl.! Stirp. crypt., Graphis stenocarpa, Spreng. part., Opegrapha astroidea, Ach. Meth., O. radiata, *β.* Pers.

* See Vol. II. p. 245.

occurs on hard bark in Cambridge, and seems to be noticed in several of our Catalogues. This genus will probably not remain separate from the next.

Graphis *curvula*, Ehrh., Spreng. Syst., Opegrapha notha, Ach., Hals. l. c.—Rough bark, Cambridge and Watertown. Not included in the Mass. Catal. The genus Graphis, to which this is here referred, as arranged by Sprengel, l. c., consists of the Opegraphæ of Persoon and Acharius, together with the afterwards separated Graphides of the latter, excluding some aberrant (mostly tropical) forms, which have been arranged in new genera by Meyer. Sprengel cites Adanson as the author of this arrangement, which may, therefore, probably have the right of priority.

Verrucaria *gemmata*, Ach., Hals. l. c., Mass. Catal. — Smooth bark, common in New England.

V. *nitida*, Schrad., Borr. in Hook., l. c., Ach. Lichenogr., Schær.! l. c., Spreng. l. c., Muhl. l. c., Pyrenula nitida, Ach. Syn. (cit. Schær.), Moug. & Nestl.! l. c., Sphæria nitida, Weig. (cit. Hook.).— Smooth bark, very common in New England. Somewhat resembling V. gemmata.

V. *punctiformis*, Ach., Spreng. l. c., De Cand. Fl. Fr., Schær.! l. c., Hals. l. c.—Smooth bark, Cambridge.

V. *epidermidis*, Ach. Syn. (cit. Schær.), De Cand. l. c., Moug. & Nestl.!, Hook. Br. Fl., Hals. l. c.— Bark of Betula papyracea, &c., Maine. Referred to the last species by Sprengel.

V. *cinerea*, Pers., Hook. l. c., V. stigmatella, Ach., Schær.! l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Port. in Mass. Catal. — Smooth bark, Cambridge.

V. *enteroleuca*, Spreng. l. c., Pyrenula enteroleuca, Spreng. in Hals. l. c., Port. in Mass. Catal., Thelotrema cinereum, Schwein. in Hals. l. c. — Smooth bark, very common throughout New England. This is apparently a true Pyrenula, a genus which is now regarded too near Verrucaria.

Endocarpon *miniatum*, Ach., Schær. l. c., Hook. l. c., — α. *umbilicatum*, Schær.! l. c., E. miniatum, Ach., Muhl. l. c., Hals. l. c., Mass. Catal. — On dry rocks, West Cambridge, Brookline, Waltham. Also Shelburne, Port.!, and elsewhere.

——— ———, β. *complicatum*, Schær.! l. c., E. complicatum, Ach., Hals. l. c. — Rocks near water, and within reach of the spray; Spot Pond, Medford.

——— ———, γ. *aquaticum*, Schær.! l. c., E. Weberi, Ach., Hals. l. c., Port.! l. c. — On rocks and stones under water, in brooks and ponds, West Cambridge, Medford, Plainfield, and elsewhere. The remark in Lindley, (Nat. Syst. edit. 2. p. 427,) that "no lichen is ever submersed," is at variance with the obvious habit of the var. γ. of this species, which certainly cannot be separated from the other Endocarpa.

Variolaria. This genus is not allowed by Sprengel, who distributes the species between Porina, Urceolaria, and Lecanora. There appears to be some

confusion in the synonymy of the common forms, owing, probably, to their considerable resemblance to each other. In mentioning the following species, I have followed the arrangement of the Methodus of Acharius.

V. *faginea*, Pers. (cit. Ach.), Ach. Meth., De Cand. l. c., Hook. l. c. — Bark, less common, perhaps, than the next. This is the V. amara of one of the later works of Acharius, and of our authors, and is sensibly distinguished from the other species allied to it by the bitter flavor of the thallus. This is caused by the presence of oxalic acid, detected in it by Mr. Braconnot, in the proportion of 29.4 of oxalic acid, combined with 18 of lime, in 100 parts of the lichen. (Hook. l. c.)

V. *discoidea*, Pers. (cit. Ach.), Hook. l. c. — Trees and old rails, very common.

V. *aspergilla*, Ach. Lich. Univ., Hook. l. c. — Old walls, rocks, and trees.

V. *velata*, Ach. Syn. (cit. Hook.), Hals. l. c., Mass. Catal. — On trees, common in New England. The apothecia greatly resemble the scutellæ of a Lecanora, and the species (according to Hooker, l. c.) is referred to that genus by Turner and Borrer.

Urceolaria *scruposa*. Since the publication of my former paper, I have observed this plant quite common on old walls and in similar situations. Mr. Russell has sent it from Chelmsford, where he finds it abundant, on rocks. At the Cambridge station, it occurred on the ground, in a sandy soil.

U. *cinerea*, Ach., — forma varians. — Alpine rocks,

White Mountains. The thallus is of a rusty red, and is copiously besprinkled with the small black apothecia. The red color is probably occasioned by oxide of iron in the rock. The plant does not appear to differ in other characters of importance from U. cinerea. Thallus distinctly areolated, but at the same time continuous and regular.

U. *cinerea*, Ach., — forma varians polygonia. — Alpine rocks, White Mountains, with the last. Thallus rusty red, often of a fine dark red, owing, as in the last, to the presence of iron in the rock. The thallus is made up of areolæ, which are much larger than in the last, distinct, or aggregated, or sometimes confluent. The apothecia minute, very irregular, often several in a single areola. This appears to differ considerably from the last, and both from our common U. cinerea; but the characters of disagreement in the plants from the White Mountains are so nearly represented in European specimens, arranged as varieties of the above-cited species, that I can hardly consider our plants distinct, even as varieties. The most striking feature of these forms is, perhaps, their color; in regard to which, besides what has been said above, we may call to mind Linnæus's pleasant application of the poet, "Nimium ne crede colori;" a precept of allowed importance in botany.

Lecidea *muscorum*, Schær.! l. c., Hook. l. c., Muhl. l. c., Patellaria muscorum, De Cand. l. c., P. sabuletorum, Spreng. l. c., Lecidea sabuletorum, Ach., Torr. l. c., Hals. l. c., Lichen sabuletorum, Flörke, L. muscorum, L. — Decayed mosses, Cam-

bridge. Also in the lower regions of the White Mountains.

L. *geographica*, Hook. l. c., Rhizocarpon geographicum, De Cand. l. c., Lecidea atro-virens, var. geographica, Ach. Meth., Lichen geographicus, L., Ach. Prodr. — Alpine rocks, White Mountains, and Chin of Mansfield, Vt. An elegant species.

L. *pruinosa*, Ach. Meth., Hook. l. c., L. albocærulescens, Ach. Syn., Muhl. l. c., Mass. Catal., Lichen pruinosus, Dicks. (cit. Hook.). — On rocks and boulders, not confined to limestone. Plainfield, Port. !, Waltham, Lexington, Medford, Manchester, and elsewhere in this vicinity, not uncommon. In the synonymy of this species, I have followed Hooker, l. c., but it is proper to refer to De Cand. Fl. Fr., where some additional facts may be found.

L. *albo-atra*, Borr. in Hook. l. c., L. corticola, Ach. Syn. (cit. Hook.), Muhl. l. c., Hals. l. c., Lichen corticola, E. Bot., Verrucaria albo-atra, Hoffm. (cit. Hook.). — Old elms, West Cambridge.

L. *anomala*, Ach. Syn., Hook. l. c., Patellaria anomala, Spreng. l. c., Lecanora anomala, Ach. Lichenogr., Parmelia anomala, Ach. Meth. Suppl. — Bark of Juniperus Virginiana, Cambridge. Apothecia remarkable for a waxy lustre, especially apparent when the plant is wet. I have some hesitation in regard to our plant, which belongs to a rather doubtful group. The Lecanora effusa of Muhlenberg's Catalogue probably belongs to it, as Hooker unites this species with Lecidea anomala. With this exception, I believe the species has not been mentioned by American authors.

L. *varians*, Muhl. l. c., Eaton, Man. The description given by Eaton agrees so well with one of our common forms of Lecidea, that I have little doubt our plant is the L. varians of the above authors. My opinion has been strengthened by an examination of labelled specimens (not, however, original) in the herbarium of Mr. Oakes. The species is somewhat remarkable, and occurs commonly on bark. Cambridge, &c.

Lecanora *ventosa*, Ach. — Rocks in Essex County, Oakes!. This fine species is abundant on Alpine rocks at the White Mountains, a station mentioned in my former enumeration, but it is wholly new to Massachusetts. On the Chin of Mansfield, Vt.

L. *tartarea*, Ach. Lichenogr., Hook. l. c., Hals. l. c., Mass. Catal., Patellaria tartarea, De Cand. l. c., Verrucaria tartarea, Hoffm., Lichen tartareus, L. — Rocks. Danvers, Oakes!, Brookline, Medford, &c., not uncommon. The cudbear of commerce.

Parmelia *perlata*, Ach. Meth., Schær.! l. c., Moug. & Nestl.! l. c., Spreng. l. c., Hook. l. c., Hals. l. c., Lobaria perlata, De Cand. l. c., Lichen perlatus, L., Ach. Prodr. — Rocks, trees, and rails, Cambridge, Waltham, Lexington, Framingham, &c., common. Also, Chelmsford, Mr. Russell. Not as yet observed in fruit. Not in the Mass. Catalogue.

P. *pulverulenta*, Ach. Syn. (cit. Hook.), Schær.! l. c., Spreng. l. c., Hook. l. c., Muhl. l. c., Imbricaria pulverulenta, De Cand. l. c., Moug. & Nestl.! l. c., Lobaria pulverulenta, Hoffm. (cit. Cand.), Lichen

pulverulentus, Schreb.; & P. venusta, Ach. Meth., cum Ic. (sec. Spreng.), nec Hals. l. c., Mass. Catal. — Bark of trees; Cambridge, and elsewhere; a not uncommon and handsome species. The P. venusta, Ach., seems, by the cited description and figure, to be too nearly allied to this species, with which it is united by Sprengel. In P. pulverulenta, the border of the scutellæ is described as either entire, or notched, or quite leafy.

P. *speciosa*, Ach. Meth., Schær.! l. c., Spreng. l. c., Hook. l. c., Muhl. l. c. — Rocks in old woods, Waltham, Medford; trunks of trees, not very general, Cambridge, Watertown, New Ipswich, N. H. Sprengel gives a habitat of this species in Boreal America, and Muhlenberg enumerates it in his Catalogue. It is, perhaps, especially in the finely fruited state (unknown in Great Britain), in which I have almost always found it, the most beautiful of our Parmeliæ. Hooker describes the lobes of the thallus as powdery at the extremities; but Acharius remarks, that they are sometimes naked: the latter is the most common state in our plant. It would seem, from the description given in Eaton's Manual, of one or two species, which are named as new species in Muhlenberg's Catalogue, that our plants (and especially the saxicoline form) are very nearly allied to these; but I am unable, at present, to ascertain this, by the necessary comparison of specimens. The saxicoline plant belongs to P. speciosa, unless it be found to differ sufficiently to form a new species; but the other, which I have mentioned as growing on trees, may, I think, prove distinct. Both, however, are nearly related to P. speciosa.

P. *ulothrix*, Ach. Meth., Muhl. l. c., Hals. l. c., Mass. Catal., Imbricaria ulothrix, De Cand. l. c., Moug. & Nestl.!, Lichen ulothrix, Ach. Prodr., L. ciliatus, Hoffm. (cit. Ach.). — Bark of trees, Cambridge, Watertown, Medford, &c. "Ciliis scutellarum (sæpe deficientibus et facile elabentibus) imprimis a Parmelia cycloselide differt, cui alias simillima." (Ach. Meth.) There is, however, in the descriptions, another character to separate these species, — the mealy warts on the margins of the lobes and elsewhere on the upper surface of P. cycloselis. These are very apparent in our New England form of this species, but I have observed the same on P. ulothrix. The latter is distinguished by a remarkable character, but it may possibly hereafter be reduced to a variety of P. cycloselis. In this case, the question might be entertained, whether Hoffmann's name, above-cited, has not the right of priority.

P. *Fahlunensis*, Ach. Meth., Moug. & Nestl.! l. c., Spreng. l. c., Hook. l. c., Imbricaria Fahlunensis, De Cand. l. c., Squamaria Fahlunensis, Hoffm. (cit. Cand.), Lichen Fahlunensis, L., Ach. Prodr. — *α. major*, Schær.! l. c., rocks, Notch of the White Mountains. — *β. minor*, Schær.! l. c., rocks, with the last. Somewhat resembling P. stygia, especially the form *β*. P. Fahlunensis is a larger and wider-lobed lichen, the extremities of the lobes not decurved as in P. stygia, the apothecia larger, and it occurs at a much less elevation. Linnæus first detected our plant about the mines of Fahlun, in Sweden.

P. *diatrypa*, Ach. Meth., Schær.! l. c., Moug. &

Nestl.! l. c., Hook. l. c., Imbricaria diatrypa, De Cand. l. c., Lobaria terebrata, Hoffm. (cit. Cand.), Lichen pertusus, Schrad. (cit. Ach.), L. diatrypus, Ach. Prodr. — Rocks, in the Notch of the White Mountains. Presents every character of the European plant. Specimens in fruit did not occur. The feature from which this species has derived its various names, diatrypus, terebratus, pertusus, is an uncommon and remarkable one. These words intimate not merely that the margins of the thallus are cribrose, irregularly perforated, as in Gyrophora erosa; but that everywhere, "passim," the thallus is marked with regular holes, "laciniis parvis foraminibus pertusis." (Ach. Meth. p. 251.) This species is new to our Flora.

Belonging to the same group of Parmeliæ which includes P. diatrypa, and the species allied to it, is a lichen, which, for want of specimens to compare with, I am still unable to determine, though I have had it several years in my collection. It presents several very striking characters and is probably already described. The long, lax, linear lobes of the thallus, which are white above, and black, ragged, and spongy beneath, and inflated at the apices, together with the large scutellæ, at first goblet-shaped, and becoming, when mature, very ample, will serve to point out the plant to other observers. I have thought it agreed generally with such brief descriptions as I have seen of a remarkable species from our Northwest Coast, — P. enteromorpha. The species occurs abundantly on the White Mountains, in the subalpine regions. I have also observed it, more

sparingly, on the summits of the Chin of Mansfield, and the Camel's Rump, the two highest of the Green Mountains, in Vermont. A Van Diemen's Land lichen, from the herbarium of Professor Torrey, seems also to belong to this species. Should our plant prove to be distinct, it may be called P. platycarpa.

P. *colpodes*, Ach. Meth., Muhl. l. c., Hals. l. c., Spreng. l. c., Mass. Catal. — Trees, Essex Co., Oakes!, Plainfield, Porter!. Also Plymouth; a somewhat rare species.

Sticta *crocata*, Ach., Hals. l. c., Port. l. c. — On rocks and trees. Massachusetts, Hals., Ashfield, Port.! l. c., Plainfield, Port.! in herb. nostr., and at Waltham and Manchester. Also in the Notch of the White Mountains, and on wood from Maine. Kennebunk, Me., Mr. Russell!. The station given by Halsey was founded on specimens from Dr. Porter. This lichen may prove to be a more common species in this country, than has been supposed. I have generally met with it on shaded rocks in old woods, and but once on trees; though Dr. Porter's specimens are from the latter. The color varies from a light lead-gray on the upper surface, and a very light brown beneath, (the young plant,) to "a very dark olive-green," as Hooker describes it, above, and a rufous-brown beneath. Mr. Russell's plant is rather "glauco-fuscous," as Acharius describes the species. The Waltham plant and that from the White Mountains are of a dark reddish-brown.

S. *aurata*, Ach. Meth., Port.! in Eat. Man. Bot.,

and in Mass. Catal., Platisma crocatum, Hoffm. (sec. Ach.), Lichen auratus, Smith in Ach. Meth. — On a boulder-stone in Western, Port. This rare and beautiful lichen, of which I have abundant specimens from its discoverer, is one of the tropical forms of Sticta. It has been found in the West Indies, by Swartz; in South America, in fruit, by Humboldt; and in St. Helena, according to Sprengel. I have a Van Diemen's Land lichen, which probably belongs to this species, from Professor Torrey's herbarium. It is also said to occur in the South of France; and there is recorded a single doubtful English station, though it would seem to be now wholly unknown in Great Britain. The Massachusetts plant did not occur in fruit, which is said by Hooker to be extremely rare.

S. *scrobiculata*, Ach. Syn., Spreng. l. c., Hook. l. c., Hals. l. c., Mass. Catal., Lobaria scrobiculata, De Cand. l. c., Parmelia scrobiculata, Ach. Meth., Lichen scrobiculatus, Scop., Ach. Prodr., & Pulmonaria verrucosa, Hoffm., Lichen verrucosus, Jacq. (fide Cand.). — Rocks in old, shady woods; Manchester, and elsewhere. Also on trees, Maine.

S. *pulmonacea*, Ach. — In fruit, a very luxuriant specimen; West Cambridge hills, Dr. Harris. A somewhat rare state of the plant. I have observed it on the White Mountains.

Collema *saturninum*, Ach. Dr. Porter sends specimens from Shelburne, which are granulated on the upper surface. The plant occurs on the Waltham hills, in Cambridge, and Watertown. Mr. Russell has found it in Chelmsford.

C. *tremelloides*, Ach. Syn., Hook. l. c., Muhl. l. c., Torr. l. c., Hals. l. c. — Rocks, Grand Monadnock mountain, N. H.; Ragland, in Brookline, near Hammond's (or Richards's) Pond; Medford hills. Also Manchester, and elsewhere, a not uncommon species, and frequently occurring in fruit. Thallus, when moist, of a dark green, and translucent; when dry, of a light lead-color, and opaque. Besides C. pulchellum, I have six other New England Collemata, undetermined; two of which were received from Dr. Porter. It is remarked by Hooker, that, in drying, these plants are necessarily much altered in form, and from this, and their variable character, there is considerable difficulty in the determination of the species. (Br. Fl. in loc.).

Nephroma *parilis*, Ach. Lichenogr., Hook. l. c., Peltigera parilis, Spreng. l. c., Peltidea parilis, Ach. Meth., Lichen parilis, Ach. Prodr., E. Bot. t. 2360. — Rocks; in the Notch of the White Mountains, infertile. This is new to our Flora.

N. *bella*: "thallo membranaceo utrinque glabro, supra badio, subtus pallidiori, lobis convexis, abbreviatis, rotundatis; scutellis fuscis margine thallode integro." Spreng. Peltigera bella, Spreng. l. c. — Trees, sub-alpine region of the Chin of Mansfield, Vt. Thallus membranaceous, glabrous; peltæ small, exactly orbicular. I have not had the opportunity to compare our New England plant with authentic specimens of Peltigera bella, and the former may prove to be distinct.

N. *aspera*: thallo sub-coriaceo glauco-fusco, supra

demum granulato, subtus pubescenti fusco-nigro ad ambitum pallidiori, lobis erectiusculis lacero-dentato-crenatis; peltis nigro-castaneis margine lacero-fimbriato. — Rocks; Ragland, in Brookline, Manchester woods, Medford hills, and Lexington. Also Chelmsford, Mr. Russell. This appears, by the description, to be near Peltigera (Nephroma) Helvetica, of Sprengel, l. c., a species said by him to be found in Switzerland, but not noticed in Schærer's Swiss Lichenography.

Gyrophora. Of the six New England species, enumerated in my former paper, two were inserted doubtfully. Further investigation has enabled me to speak with confidence in regard to both of these.

G. *hirsuta*, Ach. Meth., Moug. & Nestl.! l. c., Umbilicaria hirsuta, Hoffm., (cit. M. & N.), De Cand. l. c., Lichen hirsutus, Ach. Pr. — Rocks, in the Notch of the White Mountains. Near G. vellea, from which it is well distinguished by the characters given by Acharius. Thallus of a whitish ash-color, somewhat pulverulent; fibres of the under surface long and very distinct; tricæ hemisphærical. The plant is much smaller than G. vellea, and less rigid. In my former paper, this was incorrectly considered a form of G. vellea. G. spadochroa is another species allied to G. vellea, which may occur, though I believe it has not yet been found in this country.

G. *deusta*, Ach. Meth. var. *flocculosa*, Ach., not of E. T. Enum. Lich. N. Eng., Lecidea deusta, Spreng. l. c., Gyrophora ænea, γ. Schær.! l. c., Umbilicaria flocculosa, Hoffm., Lichen flocculosus, Wulf., L. deus-

tus, L. part. — Rocks; in the Notch of the White Mountains. A smoother variety occurred in the Alpine regions of the Chin of Mansfield, Vt. In the place above-cited, I expressed a doubt whether the plants there called "G. deusta, Mass. Catal.", (Acharius was not referred to,) were not rather a form of some other species. The name in question was communicated to me, with specimens, by a botanical friend; but I do not know that it is the G. deusta of the Mass. Catal. The plants, I am satisfied, belong to G. Muhlenbergii, and are far from the true G. deusta, above noticed.

G. *erosa*, Ach., E. T. Enum. l. c. Given in the cited Enumeration with a mark of doubt. I succeeded the last year in obtaining good specimens. The species occurs, less commonly than some others, on rocks in the alpine regions of the White Mountains, and is undistinguishable in any respect from the foreign plant.

G. *proboscidea*, Ach. — Alpine rocks on the Chin of Mansfield, Vt. This is the highest summit in Vermont, and I did not find the species on any other of the Vermont mountains. It varies somewhat, as at the White Mountains. The var. β. arctica did not occur.

G. *Muhlenbergii*, Ach. Syn., Muhl. l. c., Hals. l. c., Hook. in Frankl. Voy. cum Ic., Lecidea Muhlenbergii, Spreng. l. c.; & G. deusta, Port.! in herb. nostr., and E. T. Enum. l. c., not of Ach. — Rocks; Blue Hills, Milton, very abundant and fine. Essex Co. Oakes.! Also Cambridge, Medford, Manchester, Plainfield, Plymouth, White Mountains, in the Notch, and Grand Monadnock, N. H. There is

an interesting account of this lichen in Hooker's "Appendix to Franklin's Voyage," above cited. It is regarded by Gyrophorophagi the best species for eating. I have cited Sprengel for this plant, but the reference seems to me to be hardly satisfactory; I shall endeavour to state my doubts under the next species. The G. deusta of my Enumeration, is, as above stated, only an immature, barren form of this species. The plant occurs in this condition, not uncommonly, on walls and rocks.

G. *Muhlenbergii*, Ach. *β. alpina:* minori, crassiori, complicato. — Alpine rocks. Summits of the White Mountains. Chin of Mansfield, and Camel's Rump Mountains, Vt. A true alpine form of the species, analogous to the var. *β.* of G. proboscidea.

G. *Pennsylvanica*, Ach., E. T. Enum. l. c. I am unable to reconcile Sprengel's diagnosis of this species with that of Acharius, or with the characters of our plant. There is the same difficulty in regard to G. Muhlenbergii as described by him, and by other authors. These species resemble each other in many points, and it is not, therefore, impossible that they may have been by some accident misplaced and confounded. The G. Pennsylvanica of my Enumeration is papulose on the upper surface, and with corresponding lacunæ beneath; the under surface finely and regularly granulated, like shagreen, without ridges or reticulation; the apothecia are perfect patellulæ, considerably concave, and distinctly marginated. Now this would seem to be the plant of Acharius. So important did he consider the character of the perfect patellulæ, that he separated the

species from Gyrophora in the Methodus, and placed it with the Lecideæ. It seems also to be the G. Pennsylvanica of American authors. But Sprengel's plant is described as reticulate on the under surface, and possessing apothecia "plerisque abortientibus gyrosis," — true gyromata. My G. Muhlenbergii is not so distinctly papulose as the former; it is marked on the under surface with "ridges, lacerated, and joining ends," and the granulation is interrupted and often obliterated. The apothecia commonly occur in pits, or depressions of the thallus; they are flattish, heaped, and often very large; and always perfect tricæ or gyromata. But the G. Muhlenbergii of Sprengel is described as lacunose, and with urceolate or very concave margined patellulæ; a description, which, if I am not in error in these remarks, applies only to the former species.

G. *hyperborea*, Ach. Meth., Lecidea polymorpha, ε. Spreng. l. c., Gyrophora ænea, γ. hyperborea, Schær.! l. c., Gyromium hyperboreum, Wahlenb. Fl. Lapp., Lichen hyperboreus, Ach. Prodr., L. superf. subtus lacunata, L. Fl. Lapp. — Alpine rocks. Rocky peaks of the White Mountains, abundant (subtus rufa). Summits of the Chin of Mansfield, and the Camel's Rump, Vt. (subtus nigra). Very different from any of our common species, but nearly allied to the next, with which Schærer has united it.

G. *polyphylla*, Hook. l. c., Lecidea polyphylla, Spreng. l. c., G. ænea, α. Schær.! l. c., Gyromium polyphyllum, Wahlenb. l. c., Gyrophora glabra, Ach. Meth., Lichen glaber, Ach. Prodr., Umbilicaria polyphylla, Hoffm., Lichen polyphyllus L. — Alpine

rocks. White Mountains. Acharius distinguished his Lichen glaber from the form which constituted Linnæus's Lichen polyphyllus, making the latter a variety of the former. They are not now kept separate, and Hooker has restored to the species the name given by Linnæus.

CETRARIA *Islandica*, Ach., E. T. Enum. l. c. I found this, the last year, in fruit, abundantly, in the alpine regions of the White Mountains. This is a very rare state of the plant in temperate countries. Our plant is smaller than the boreal form of the lichen, but it does not appear to differ in any other respect. This lichen seems to be very generally diffused, and may be regarded common. I am acquainted with the plant in the following stations: — White Mountains; Chin of Mansfield, Camel's Rump, and other of the Green Mountains, Vt.; Lynn hills; Newton hills; and Ipswich, Cambridge, and Watertown, in sandy fields. Also Hingham, Mr. Russell; New Haven, Conn., Nuttall; and Adirondack Mountains, New York, Mr. Macrae. It is also enumerated in the Catalogues of Muhlenberg, and Torrey, and in the Flora of Michaux.

C. *Islandica*, Ach. var. *γ. crispa*, Ach. Syn., Schær.! l. c., Alpine regions of the White Mountains; Summit of the Camel's Rump, Vt. A delicate, crisped, alpine form.

C. *cucullata*, Ach., E. T. Enum. l. c. I met with this finely in fruit, the last season, on the White Mountains; a state of the plant very uncommon in this latitude. The species is characterized by Acha-

rius, as having a "sanguineo-fuscous" base. His variety β. nipharga is said to have a purplish-violet base. Our plant is variable in size, and habit of growth, and also in the intensity of the colors. A tall form is common, of a light-green above, and with a base more or less sanguineo-fuscous, passing into violet. Another form is smaller, very cæspitose, and quite green, with a dark violet, almost black, base. Both of these occurred in fructification. I found this species also on the summits of the Chin of Mansfield, and the Camel's Rump, Vt.

C. *nivalis*, Ach., E. T. Enum. l. c.—Occurred on the alpine summit of the Chin of Mansfield, but not elsewhere in the Vermont Mountains.

C. *juniperina*, Ach. *β. pinastri*, Ach. I found this at the White Mountains on the small branches of dwarf firs, upon which it is said to grow in Britain; but the plant occurred very luxuriantly on rocks, just below the summit of the Nose of Mansfield, and also on the Camel's Rump, Vt.

Growing on the small branches of trees, a little below the subalpine region of the White Mountains, I have frequently gathered a Cetraria allied to the last, but of a very different aspect. This also occurred in similar places on the Chin of Mansfield, and the other highest peaks of the Green Mountains, in Vt. It may be described as follows; — thallo subcoriaceo expanso glabro virescenti, subtus dilute castaneo, margine ascendente crispo. Peltæ not seen. Should it prove to be new, which I somewhat doubt, it may be called C. virescens.

C. *glauca*, Ach. Meth., Schær.! l. c., Hook. l. c.,

Hals. l. c., Mass. Catal. — Trees, in the northern parts of New England, not uncommon; as yet infertile.

BORRERA *furfuracea*, Ach., Hals. l. c., E. T. Enum. l. c. — Trunks of trees in old woods, not very uncommon. Mr. Russell has made this plant an object of some attention, and has favored me with abundant specimens from Chelmsford. I have never seen it in fruit. There occurs in the subalpine regions of the White Mountains, and I found the same on the summits of one of the Green Mountains in Vt., a smaller, more glabrous form of this species, which seems to be near the variety called *β. ceratea*. I have also from Chelmsford another small variety, remarkably "floccoso-furfuraceous" above.

CORNICULARIA. The two species of this genus alluded to in my former paper, as occurring on the White Mountains, I have this year obtained in abundance, and find, as I suspected, that they are identical with two European forms.

C. *aculeata*, Ach. Meth., Schær.! l. c., Moug. & Nestl.! l. c., De Cand. l. c., Hook. l. c., Coralloides aculeatum, Hoffm. (cit. Wahlenb.), Lichen aculeatus, Ehrh., Ach. Prodr., Wahlenb. l. c. — On the ground; alpine regions of the White Mountains. This handsome species occurred abundantly on the dry soil, formed apparently by the recent disintegration of the mica-slate, on the western descent of the summit of Mt. Pleasant, and elsewhere, in similar places. It was frequent in fruit. This (the fruit) is

well described by Hooker; but Acharius, when he published the Methodus, seems not to have met with it in perfection, and his description is, therefore, in this respect, incomplete; while Wahlenberg omits to notice it altogether.

C. *bicolor*, Ach. Meth., Schær.! l. c., Moug. & Nestl.! l. c., De Cand. l. c., Hook. l. c., Parmelia bicolor, Spreng. l. c., Usnea bicolor, Hoffm. (cit. Spreng.), Lichen bicolor, Ehrh., Ach. Prodr.—Among mosses and other lichens, in the alpine regions of the White Mountains. Hooker aptly compares this plant to coarse horse-hair. The extremities of the black thallus are pale-brown, whence the name. Infertile.

Sphærophoron *fragile*, Ach., E. T. Enum. l. c. I found this in fruit, abundantly, the last year, on the White Mountains. S. coralloides still found barren. S. compressum has not yet been discovered.

Stereocaulon *paschale*, Ach. This seems to be now regarded a variable plant, and a disposition is apparent in late authors, to refer back to it, as the typical form of the genus, several of Acharius's species of Stereocaulon. This species is common with us, but I have not elsewhere seen it so fine as in the Notch of the White Mountains. A small variety, which I have from the summit of Mt. Holyoke, seems to deserve some notice. I have also collected what I suppose to be the same with this on the Medford hills. It is much dwarfed, growing in quite close masses or clusters, is considerably granulated at the extremities of the branches, and the

cephalodia are small and inconspicuous. It would seem to resemble S. botryosum, Ach., considered by Borrer only "a dwarfish variety of S. paschale," but does not so well agree with Schærer's specimen of that plant.

S. *glaucescens:* thallo erecto, albescente, basi nudiusculo, ramis dichotomis, ramulis extremis granulosis; cephalodiis convexis, albo-glaucescentibus. — Rocks; in the Notch of the White Mountains. Cephalodia white-glaucescent. The color of the apothecia, in the known species of this genus, is brown, of some shade or other, and I have seen no notice of any variation from this of a kind so striking as the present. It does not appear to be accidental.

Cladonia *subuliformis*, Hoffm. *β. taurica*, E. T. Enum. l. c. — Highest summits of the Adirondack Mountains, N. Y., Mr. Macrae. The species did not occur on any of the Green Mountains, whose elevation is considerably less than that of the above.

——— ———, *γ. glebulosa*, C. vermicularis, γ. glebulosa, Schær.! l. c. — On the ground, with α., and β., alpine regions of the White Mountains. Well named by Schærer glebulosa; i. e. cloddy.

C. *gracilis*, Hoffm. No less than thirteen varieties or forms of this species are given and named in the elaborate work of Schærer. The plant mentioned in my previous paper may perhaps be regarded as the typical form of the species with us. This is tall, delicate, and of a light-green color; the cups rather small, as well as the cephalodia. This occurred the last season on the summit of the Camel's Rump, Vt.

Beside this, I have found two other forms, which, though differing considerably in some respects from the typical form of C. gracilis, an examination of Schærer's series of this species has led me to unite with it. The first of these may be called, — var. *grandis:* podetiis grandioribus fuscis sæpe squamosis; cephalodiis magnis nigro-fuscis. — In the alpine regions of the White Mountains; and in similar situations on the Chin of Mansfield, Vt. A conspicuous and abundant alpine lichen, quite different in appearance from the ordinary C. gracilis, but probably one of the various forms of that species. The other plant above mentioned, I have less difficulty in referring to one of the varieties indicated by Schærer. It appears to be the var. *γ. macroceras, B. elongata,* Schær., identical with Cenomyce ecmocyna, γ. macroceras, B. elongata, of Ach. The character is intimated by the names, and consists in the length and size of the podetia; and especially in the elongation and furcation of the branches of the scyphiform extremities. This occurred on the White Mountains, with the last, barren.

C. *cornucopiæ,* Hoffm., Spreng. l. c., Scyphophorus endiviæfolius, Hook. l. c., Cenomyce endiviæfolia, Ach. Lichenogr., and Syn., Hals. l. c., Mass. Catal., Bæomyces endiviæfolius, Ach. Meth., Lichen endiviæfolius, Dicks., Ach. Prodr. — Sands; in Cambridge and Watertown; in fruit, abundant.

C. *foliacea,* Hoffm., Spreng. l. c., Scyphophorus alcicornis, Hook. l. c., Cladonia alcicornis, Schær.! l. c., Cenomyce alcicornis, Ach. Syn., Muhl. l. c., Hals. l. c., Lichen alcicornis, Lightf., C. fo-

liaceus, Huds. — Mossy rocks, Manchester, and elsewhere. "Senescens lichen," says Acharius, "omnino mutatur. Thallus fere evanescit et prolificatione scyphorum atque podetiorum sub nova forma exsurgit; quam distinguere debui, ne confundatur cum speciebus sectionis subsequentis s. Cladoniis proprie sic dictis." In this state, the lichen has all the appearance of the subulate-branched Cladoniæ, the section which includes C. rangiferina, and the species allied to it. It occurs also at Manchester with the podetia very leafy, constituting the variety phyllophora of authors. There is a good figure of this in Vaillant (Bot. Par. t. 21, f. 3. cit. Ach.).

C. *digitata*, Hoffm., Schær.! l. c., Spreng. Syst., Scyphophorus digitatus, Hook. l. c., Cenomyce digitata, Ach. Syn., Bæomyces digitatus, Ach. Meth. — Subalpine regions of the White Mountains. The descriptions of some of the books do not well accord with this form of C. digitata; though an examination of Schærer's specimens has led me to refer it, without doubt, to that species. It appears to be very near the variety named brachytes by Acharius. Lobes of the thallus very ample, larger than in any other of our cup-bearing Cladoniæ, of a fine green above, and beneath yellow at the base, becoming white at the margins. The podetia small, in comparison with the size of the lobes of the thallus, and the scarlet cephalodia very minute. New to our Flora.

C. *squamosa*, Hoffm., Schær.! l. c., Spreng. l. c., Scyphophorus sparassus, Hook. l. c., Cenomyce sparassa, Ach. Syn., Bæomyces sparassus, Ach. Meth. — Subalpine region of the White Mountains; and at

Manchester, Essex Co., Oakes! Several varieties occur.

C. *cariosa*, Schær.! l. c., Spreng. l. c., Cenomyce cariosa, Ach. Syn. (cit. Schær.), Muhl. l. c., Torr. l. c., Hals. l. c., Bæomyces cariosus, Ach. Meth., Lichen cariosus, Ach. Prodr. — Barren soils. A small dwarfed form is common. Cambridge, &c.

Pycnothelia. This genus was proposed by Dufour to include an anomalous lichen, which had been originally referred by Acharius to a section of his genus Bæomyces, and, when this genus was divided, to Cenomyce. Hoffmann and Sprengel have retained it among their Cladoniæ; but Hooker confirms the arrangement of Dufour. "There is something," says that learned author, "in its habit so different from the other Cladoniæ, that I do not well see how it can be united either with Cladonia or Scyphophorus." (Br. Fl. II. 241.)

P. *Papillaria*, Hook. l. c., Cladonia Papillaria, Hoffm., Spreng. l. c., Cenomyce Papillaria, Ach. Syn., Bæomyces Papillaria, Ach. Meth., Lichen Papillaria, Ehrh., Ach. Prodr. — On the ground; (barren soil, recently formed by the disintegration of the mica-slate, and composed very much of fragments of rock,) in the alpine regions of the White Mountains. This is quite small; and I observed it only on the peculiar soil above described.

P. *scolecina*: "thallo crustæformi, granulato-lobato; podetiis cylindraceo-ventricosis, granulatis, simplicibus, albo-cinerascentibus; cephalodiis terminalibus, solitariis, rufo-fuscis." Ach. Bæomyces scolecinus, Ach.

Meth. cum. Ic. — Upon old rails, Cambridge, and elsewhere. Acharius placed this in the same section of his genus Bæomyces, which included the species now constituting Pycnothelia. This still seems its natural position, though it is much nearer the cup-bearing Cladoniæ than P. Papillaria, and, I have thought, may almost be said to connect the latter with the former, especially with the group which includes C. cariosa.

The study of our lichens cannot be satisfactorily pursued, until we have a complete synopsis of our own species. To this, however prospective it may be, these pages are offered as some contribution. That they may lead others, whose ability has been shown already, to add their larger stores, is the writer's hope.

ART. VII. — NOTICE OF MINERALS FROM NEW HOLLAND. By FRANCIS ALGER, a Member of the Society. (Read June 4th, 1840.)

FOR the minerals of which I propose to offer a brief notice on the present occasion, I am indebted to John Eldridge, Esq., of Yarmouth, Mass., who very liberally permitted me to select them from a collection purchased by him several years since, while on a visit to Calcutta, to which city they had recently been brought, as "curiosities," by a person from the coast of New Holland. Their exact locality it is not in the power of Mr. Eldridge to give me; a circumstance to be regretted, as the information

would give additional interest to the specimens, by directing future discoverers to the spot where others of still greater interest might probably be met with. They comprise several species of the genus Kouphone-spar, with varieties of rhombohedral and uncleavable quartz of Professor Mohs. Their uniform gangue is amygdaloidal trap, to which they are attached in geodes, or groups of implanted crystals, or in compact nodules filling up the cavities of the rock.

This trap is exactly similar to that brought from Ireland, the Hebrides, the Ferroe Islands, and, more recently, from Nova Scotia. There are a few masses of a more compact character among the collection, giving evidence of the contiguous occurrence of genuine basalt; thus offering a new object of interest, which we hope will induce some enterprising naturalist to explore this region, now that the facilities of communication with it have so much increased. Less is known of its mineralogical productions than of any other department of its natural history, though the public has been favored with the journals of several scientific expeditions to Australia. These works I have consulted with the view of finding the probable localities of the minerals now referred to, and I have thus obtained information which applies to a few of them. I find mention of both amygdaloid and basalt in the interior, as well as upon the sea-coast; but these rocks are spoken of only as affording remarkable picturesque or geological scenery, and not in reference to their contained minerals. Among the specimens brought home by Captain King, who made a survey of the western coast of

Australia, between the years 1818 and 1822, were agate, jasper, carnelian, green chalcedony, and heliotrope, bearing with them portions of the trap rock, but unaccompanied by any of the zeolites.* In describing the same class of rocks, Major Mitchell, the author of a more recent and fuller journal of observations,† has enumerated the following substances, (in addition to the quartzose minerals referred to,) forming large veins and masses in the trap; "decomposed feldspar," "granular feldspar," "crystals of glassy feldspar," and "laminated feldspar." As these substances are not very common in secondary or basaltic trap, I would respectfully suggest whether it is not possible that the author may have mistaken their true character, especially as he was obliged to pass rapidly from place to place, and does not appear to have collected specimens of them for subsequent examination. By the unpractised eye, efflorescent zeolite might be readily mistaken for decomposed feldspar, and other species of zeolite or carbonate of lime, confounded with the other varieties of feldspar. We may think it highly probable, therefore, that, if

* See the Appendix to King's narrative, drawn up by Dr. Fitton. Analogous specimens are also described in the journal of M. Péron, one of the naturalists in the French expedition to New Holland, at about the same period.

† Major T. L. Mitchell, the Surveyor-General of three expeditions, into Eastern Australasia, Australia Felix, and New South Wales, fitted out under the direction of the British Admiralty. His narrative in two octavo volumes, with numerous plates and maps, published in London, in 1838, in its detail of incidents and discoveries, is one of the most remarkable works of the kind that has ever appeared. The author has even made known to us the existence of the craters of recent volcanoes and immense mountains of lava, in the *interior* of that vast country.

Major Mitchell had given the same attention to minerals, which he has evidently bestowed upon other branches of Natural History, many interesting substances, in this department, would have been brought to light, and the mineralogical interest of his work greatly enhanced. It would appear, then, that none of the Kouphone-spars have been described by either of the writers whose observations have reached us, and I am not aware that any of a more recent date have appeared. They are, I believe, the first and only collection of minerals which has been brought to this country from New Holland; and certainly their uncommon beauty, and the perfection of their crystalline forms, demand for them some public record.

Apophyllite. (Pyramidal Kouphone-spar, M.) — There are peculiarities in the secondary modifications of the crystals of this mineral, as well as in the general appearance of the specimens, which evidently

Fig. 1.

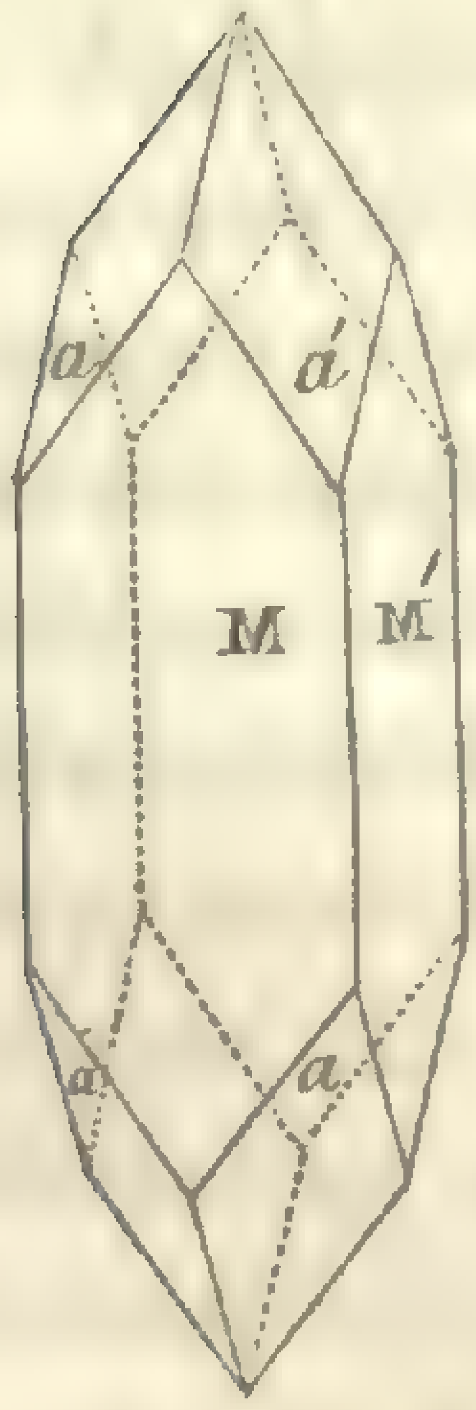


Fig. 2.

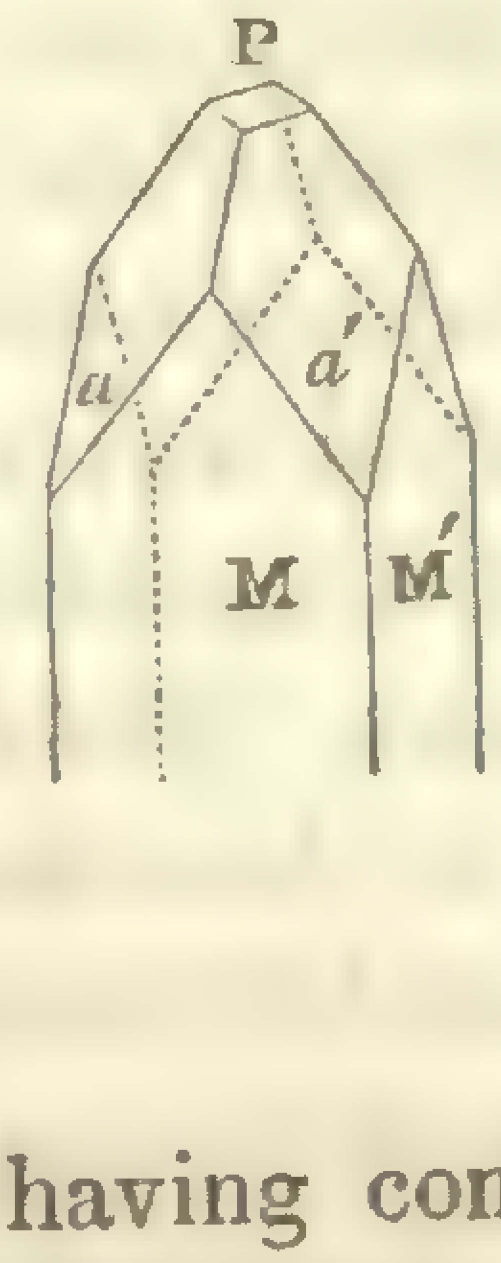


Fig. 3.

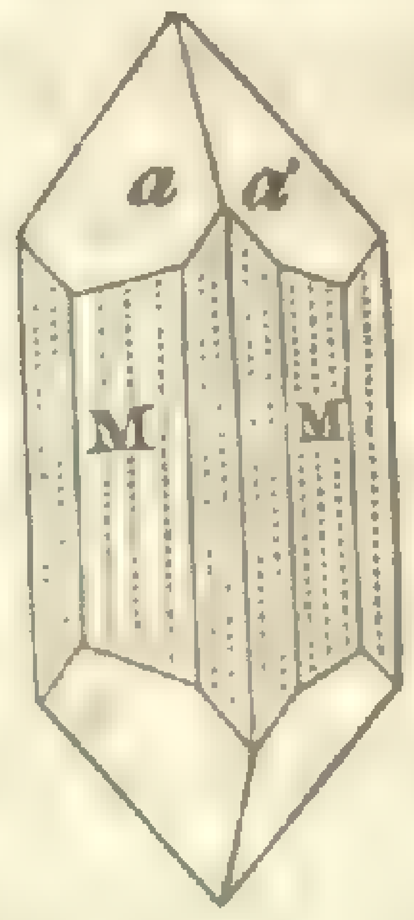
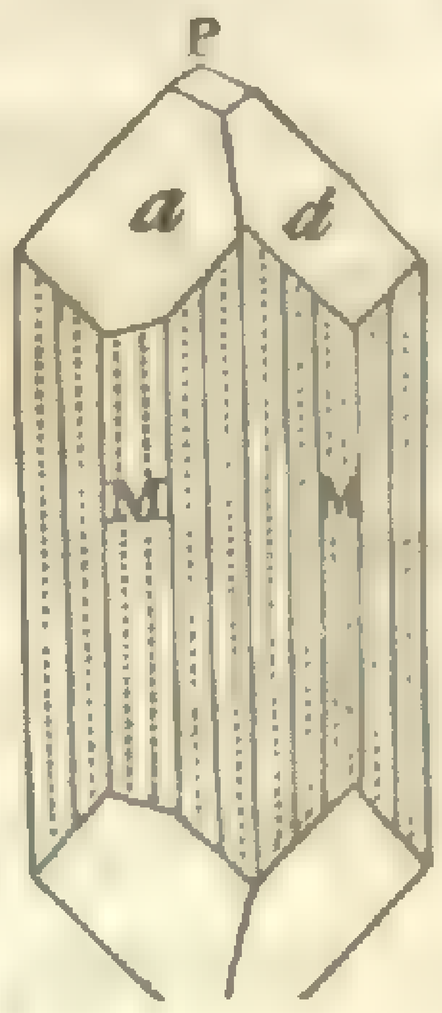


Fig. 4.



indicate their having come from localities quite distinct. In one, Mésotype *épointée* of Haüy, the pri-

mary square prism is in elongated crystals, replaced on all the solid angles by triangular planes, and often so deeply as entirely to obliterate the terminal primary faces P, at both extremities of the crystals; thus tending to two four-sided pyramids having square bases, as in Fig. 1. But, as the crystals are usually implanted on the matrix in a vertical position, they commonly present only one of the pyramids, the apex being entire, or showing a portion (sometimes only visible by the microscope) of the summits of the prism, as in Fig. 2. Sometimes one of the faces of the pyramids is considerably extended at the expense of the two adjoining ones.

The lateral edges from *a* to *a*, Fig. 1, are always replaced, sometimes by a tangent plane, inclining equally upon the two adjacent lateral planes, but most frequently by two planes, each of these being again followed by another very narrow plane, leaving scarcely any remaining portion of the primary faces; thus imparting to the crystals an oval or cylindrical shape, and, in connexion with the low pyramids of the summits, rather a barrel-shaped appearance. Fig. 3 represents one of the crystals of occasional occurrence with the bevelment of the edges, the decrement of the summit being complete and showing the whole of the lower pyramid, where it unites with the matrix. Fig. 4 represents another of these crystals with the additional planes. The dotted lines on these figures are intended to show deep grooves, or striæ, which extend longitudinally along the faces of the crystals, or parallel with their prismatic axes, and probably indicate the faces of cleavage in this direc-

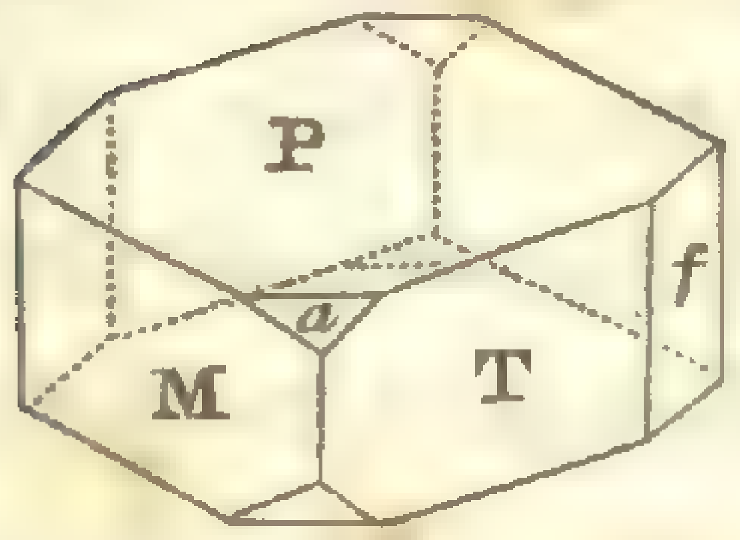
tion. This cleavage, however, is obtained with great difficulty, as is the case with this mineral from other localities, the dismemberment of the folia being interrupted by cross fracture. There are also transverse striæ on some of the crystals parallel with the opposite cleavage, appearing very rarely upon the acuminating faces. The larger crystals, which are nearly of the size of the last figure, are of a grayish white color, and nearly opake ; the smaller are colorless and transparent. These crystals are highly axotomous, the folia separating with great readiness parallel to P, and the faces of this cleavage present a high pearly lustre, though not superior to that of some of the faces of crystallization in the same direction. Faces M, M, vitreous, some smooth and shining, others roughened and dull. Faces *a*, *a* of the pyramids, with few exceptions, perfectly smooth and brilliant, pearly. The proportion between the length and breadth of these crystals is variable ; but, in the smaller, and most perfect ones, it is not less than four to one.

The other crystals of apophyllite alluded to, are of greater dimensions, measuring frequently an inch through the vertical axis of the prism. They are derived from a square prism, scarcely distinguishable, in the comparative length of the lateral and basal edges of the crystal, from a cube, and present only simple replacements on the solid angles, by perfectly smooth and brilliant planes of a high pearly lustre, resembling specimens in the writer's collection from Iceland.* The lateral faces are frequently composed

* I have in my possession (from Nova Scotia) several large and transparent crystals of this mineral, of which several from one local-

of curved laminæ; and the mineral sometimes presents compound varieties, consisting of lesser individuals, flattened or compressed, so as to show only portions of their planes, or sections of smaller crystals, which have been prevented, by their mutual contact, from assuming their full and perfect proportions. These are united by similar parts, so as to have their similar faces in parallel position with each other. The surfaces of several of the larger crystals are free from these combinations, having bright, polished planes, measurable by the common goniometer. The amygdaloid to which they are attached, abounds in vesicular cavities, some of which are filled by green earth and hollow nodules of chalcedony.

Fig. 5.



Heulandite. (Hemi-prismatic Kouphone-spar, M.)—The individuals of this species present the primary form, replaced on the obtuse solid angles by very minute scalene, triangular planes, resembling the subjoined Fig. 5, and being usually of nearly the same size. Color, pure white; lustre of P, pearly; secondary planes *a*, *f*, vitreous; but the faces M, T, possess a dull, waxy, or opalescent lustre, which I have not before observed in the crystals of this mineral, apparently, however, confined to the surface; and the same faces are more or less curved

ity present replacements of *three* planes upon the solid angles, as in the case of Analcime; a modification which I do not find mentioned as having been before observed in the crystals of this species. I intend, at another time, to refer again to this beautiful mineral, in connexion with some other facts obtained while on a short visit to Nova Scotia, during the last summer.

or hollowed, so as not to admit of measurement by the goniometer. Some of these faces form a regular uniform curve, inclining equally towards the terminal planes P, obliterating the small replacements *a*, *f*, which are usually very distinct.

Stilbite. (Prismatoidal Kouphone-spar, M.)—The crystals generally are not well defined, the masses consisting of pure white, pearly folia, forming sheafs or fasciculated groups, showing at their free extremities, only imperfect crystalline faces of a low pyramid, inclining from the solid angles of the prism. Some of these masses, composed entirely of the stilbite, are of a globular form, presenting on fracture, a radiation of fibres from a common centre. A few small, but very brilliant and perfectly transparent crystals of this mineral, were, however, seen in some of the vesicular cavities of the amygdaloid, exhibiting the primary prism, compressed into low, six-sided tables, the four replacements at the summits of the prism being narrowed down, so as to form regular beveled edges upon the four corresponding sides of the tables, producing a form nearly similar to Fig. 6, taken from the System of Mineralogy by Beudant, Vol. II., plate x. fig. 62.

Fig. 6.

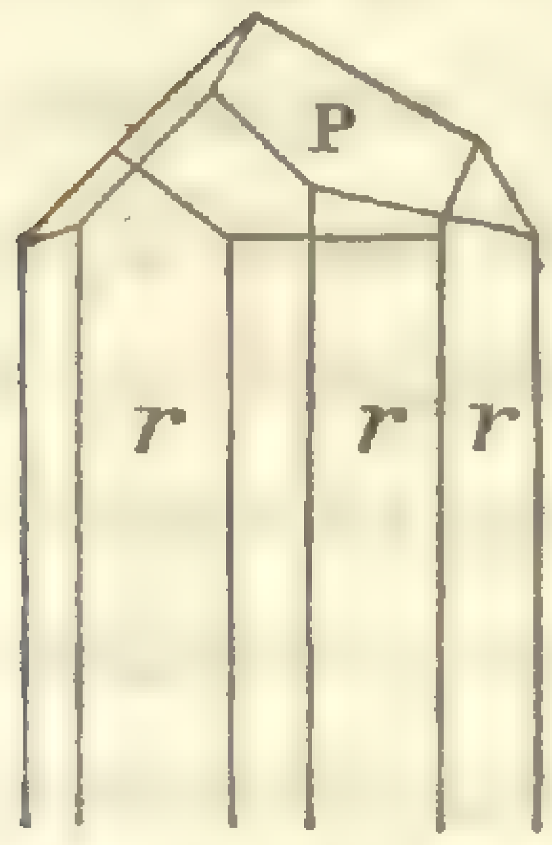
Mesotype of Phillips. (Peritomous Kouphone-spar of Haidinger.)—A nest of the crystals of this mineral was met with in the form of small implanted individuals, occupying the cavity of a mass of quartz and chalcedony. They are in elongated rhombic prisms, colorless, transparent, and of a glassy lustre; but a few of them have a silky, fibrous appearance,

similar to some of the specimens met with in the more ancient lavas of Vesuvius. They do not form groups of united, divergent crystals.

Rhombohedral Quartz.—I was so fortunate as to find among this collection, besides several of the subspecies of this mineral, two or three specimens exhibiting the primary obtuse rhomboid in great perfection, and of considerable size; some of them measuring half an inch across their planes. They present highly polished surfaces, are transparent and colorless; and it is evident, I think, that they cannot be regarded as *pseudomorphs* of any other mineral, from the agreement in the value of their angles, as measured by the goniometer, with those of the obtuse rhomboid established as the fundamental form of the species, as well as from the fact, that the crystals are imbedded in cacholong, which now occupies the interior of the geodes. If pseudomorphous, the mineral of which they are imitative, must have been removed, so as to admit of a subsequent infiltration of the cacholong. It is more probable, that the quartz and cacholong were formed at the same time, the latter affording a soft matrix in which the crystalline molecules could freely arrange themselves, according to the laws which governed them.

Two other modifications of rhombohedral quartz were met with among these specimens, of comparatively rare occurrence. In one, the primary rhomboid, by a very deep truncation of its lateral solid angles, has given rise to long, six-sided prisms, terminated by trihedral summits, there being no triangular replacements upon the upper edges of the rhomboid, by which the usual six-sided pyramids are

Fig. 7.



produced. See Fig. 7. On some of the rhomboids, however, which do not present any portion of the faces parallel with their axes, we may observe the small triangular planes which finally produce the six-sided pyramids. The terminal primary planes P, are smooth and bright, while the elongate faces *r*, are curved and roughened by transverse striæ. Sometimes the usual six-sided prisms, terminated by similar pyramids, have their *alternate* lateral solid angles replaced by small rhombic planes, inclining equally upon the sides of the prism, producing the quartz *rhombifère* of Haüy. The sides are also striated parallel with their edges of combination with the faces of the pyramids. This author (*Traité de Minéralogie*, Tome Second, p. 413) describes these rhombs as existing *only* on the alternate angles; but in the later works of Mohs, Beudant, and others, they are figured also upon the intermediate angles, being always represented as covering but a very small portion of the acuminating pyramids. According to Phillips, the "Bornholm Diamonds" afford the most perfect examples of this modification.

Green Chalcedony and Heliotrope. — This first-mentioned mineral is of a deep serpentine green color. It breaks with a conchoidal fracture, disclosing, in the centre of the mass, blood red spots of jasper, and thus constitutes the heliotrope. There are spots also of a lighter green, and bluish white chalcedony, interspersed with the deeper ground, which, if polished, would render the specimens highly ornamental in jewelry.

Ribbon Agate and Moss Agate. — These two interesting varieties appear in the same specimens. The branching fibres or dendrites of the latter, of a brown or reddish-brown color, are imbedded in a deep ground of transparent blue and white chalcedony, the white chalcedony appearing like a delicate cloud passing through the mass, while the former is produced by parallel zigzag lines of a pure milk-white chalcedony, alternating with narrow stripes of the same blue ground, the parallelism forming a beautiful border to the specimens, and enclosing the curious moss-like ramifications which are characteristic of this variety. In one specimen, the green chalcedony has assumed the branching form, and is freely distributed through the same ground of blue and white. If polished, these several varieties will vie in beauty with the finest oriental specimens. They are usually more or less accompanied by masses of pure opake white chalcedony, and also by a stalactical, botryoidal variety of several shades of color, interspersed with quartz crystals, and attached to portions of the trap.

Cacholong. — This variety forms thin crusts upon the surfaces of the fragments of quartz, and fills the space in which crystals of the latter have been formed. It presents the common characters of opacity and adhesiveness to the tongue. It also enters into the composition of a coarse ribbon agate, and under this form there are portions of the mass that resemble the onyx agate.

Chlorophæite. — Small globular masses, soft, of a greenish color, translucent when first broken, and presenting a conchoidal fracture, occupy the vesicular

cavities of the same amygdaloid which forms the gangue to the apophyllite before described. It is sufficiently distinguished from chlorite or green earth, and precisely resembles this mineral from Scotland. The opinion of most mineralogists is, that this mineral is only a variety of some other species, or the remains of some other, which has undergone decomposition. I am led to regard the latter opinion as the true one in the present case, from the occurrence of small granular concretions of what appears to be zeolite in the centre of those masses which have not entirely disappeared; though the infusibility of the decomposed mineral before the blowpipe would seem to show that some of the ingredients of the zeolite have passed away. Shepard regards the mineral as decomposed mesotype.

In breaking some of the masses of quartz found in this collection, I was struck with the singular opalescent and waxy appearance of a fibrous and radiated mineral, which was at first supposed to be stilbite or mesotype, and which forms veins and globular knots within the quartz. Its characters before the blowpipe soon satisfied me that it could not be identical with either of these species or with any other of the Kouphone-spars; nor am I acquainted with any other substance to which it bears any near resemblance in its general characters. It may prove to be a new species; but the absence of any regular crystalline faces in the specimens compels me, thus far, to rely solely upon other peculiarities for the determination of its character. Of these, I have drawn up a description, with which, however, I shall not occupy your attention, until I am enabled to add

the results of an analysis of the mineral now making by my friend Mr. Hayes, whose accuracy in this department of science is well known to the members of this Society, as well as to the friends of science generally.

ART. VIII. — DESCRIPTIONS OF THIRTEEN NEW SPECIES OF NEW ENGLAND SHELLS. By C. B. ADAMS, Member of the Bost. Soc. Nat. Hist., Prof. Chem. and Nat. Hist. in Middlebury College, Vt.

THE marine species of shells, which are described in the following article, have been found only in New Bedford and its immediate vicinity. They are rarely obtained, even by dredging. From their station and their rarity, they have hitherto eluded observation. In my examination relating to them, I have been much indebted to Mr. C. F. Shiverick, of New Bedford, whose persevering and close observation, has contemporaneously or subsequently to my own researches, secured most of the specimens which have been distributed. To the same gentleman I am also indebted for the *discovery* of three of the fresh-water species. To my friend, Dr. A. A. Gould, I am much indebted, especially for the figures of all the species described.

PLEUROTOMA PLICATA.

Plate III. Fig. 6.

P. testâ parvâ, crassâ, ovato-fusiformi, albido-fuscâ, striis et plicis decussatâ; epidermide tenui; anfractibus sex; suturâ valdè impressâ; aperturâ ovatâ; labro arcuato, sinu lato; caudâ brevi; columellâ acutâ.

Shell small, thick, ovate-fusiform, cinereous brown through (and light or dark brown beneath) the epidermis; *epidermis* membranous, thin, dull, cinereous; *whorls* six to seven, convex; *suture* deeply impressed; *spire* five-ninths of the length of the shell, longitudinally and coarsely plicate below the first or second whorls (which are smooth), decussated by transverse small ribs or coarse striæ; *body-whorl* larger than the spire, sculptured as the upper whorls, with 10 to 12 longitudinal ribs, extending to the canal, either continuous or alternating with those on the penultimate whorl, with 13 to 15 transverse striæ on the back of the body whorl, oblique on the canal, very oblique on its left side; *aperture* elongate-ovate, the line of its length at an angle of about 30° with the axis of the shell, four-ninths of the length of the shell; *labrum* brown or yellowish-brown internally, somewhat arcuate, much thickened by the last plication, beneath which is a groove, reaching from the sinus to the canal, and sharpening the edge; *sinus* a little below the junction of the labrum with the last whorl, rounded and broad at the bottom, occupying one-fifth of the length of the labrum, in mature specimens nearly as deep as broad; *canal* short; *columella* somewhat excurved, acutely terminated; *labium* in its upper third arching over to meet the labrum; *umbilicus* wanting; *operculum* unknown.

Average size; length, .5 inch; breadth, .25 inch; largest specimen, .52 inch by .21 inch.

Cabinets of the Bost. Soc. Nat. Hist., of Middlebury College, of Mr. C. F. Shiverick, of New Bedford, and my own.

Station. This species lives in mud below low-water mark.

Habitat. Harbour of New Bedford.

Remarks. During the summer of 1839, two dredging-machines were worked in the harbour of New Bedford. This species was found in the mud thrown up, with several others rarely or never found above low-water mark. Mr. Shiverick has found it at Clark's Cove, in Dartmouth. It resembles *Fusus harpularius*, but the presence of a very distinct sinus, as well as the coarseness of the revolving striæ, readily distinguishes it.

Cerithium terebrale.

Plate III. Fig. 7.

C. testâ parvâ, elongatâ, fuscâ, sæpe albo-cinctâ ; anfractibus duodecim, planulatis, cum quatuor elevatis lineis ; spirâ elevatâ, conicâ ; suturâ subimpressâ ; aperturâ ovatâ, parvâ.

Syn. C. Emersonii, var. nob.

Shell small, elongated, brown, frequently with a white band, with rather slight incremental striæ ; *whorls* eleven or twelve, flattened ; *spire* seven-eighths of the length of the shell, five-sixths of its bulk, its opposite sides containing an angle of about 20°, conic, with four elevated, obtuse, revolving lines on each whorl, of which the first and second, and third and fourth are equidistant ; the space between the second and third is obviously less on the upper whorls, but approaches to an equality with the other spaces, in the growth of the shell ; the first three ridges are equal, and the fourth small and depressed,

so as to lie almost wholly beneath the first of the succeeding whorl; the *suture* consequently appears on the upper side of the first ridge, and is moderately impressed; spaces between the ridges crossed by more or less elevated irregular lines, or coarse striæ of growth; *last whorl* on the upper half, sculptured as the spiral whorls, with a fifth smaller revolving line on the lower part; *aperture* ovate, one-eighth of the length of the shell, the line of its length making an angle of about 25° with the axis of the shell; *labrum* thin; *canal* rather more than a third as long as the aperture, turning to the left.

Length, .46 inch; width, .13 inch.

Cabinet of Bost. Soc. Nat. Hist., of Middlebury College, of Mr. C. F. Shiverick, and my own.

Station. In soft mud, below low water mark.

Habitat. New Bedford and the vicinity.

Remarks. This species was at first regarded as a variety of *C. Emersonii*, but the subsequent examination of numerous specimens has satisfied me that the distinctive characters are constant. It differs from that shell in having a large elevated ridge in place of the carina on the upper part of the whorls, and in having three equal ridges in the upper whorls of the spire. The entire want of granulations distinguishes it from the common type of that species. It is distinguished from the *Murex tubercularis* of Montagu by the same character. The latter is said to have but three revolving ridges, and is also of much less size than our shell. A number of dead specimens have been obtained by dredging, and Mr. Shiverick has found a few in a fresh condition.

Jaminia producta.

Plate III. Fig. 8.

J. testâ parvâ, albidâ, cylindraceâ ; epidermide fuscâ, nitidâ, erosâ ; anfractibus octo ; suturâ impressâ ; spirâ productâ, truncatâ ; aperturâ sub-ovatâ, suprà contractâ, infrà latè rotundatâ ; columellâ uniplicatâ.

Shell small, moderately thick, ashy white beneath the epidermis, conico-cylindric, with fine irregular striæ of growth ; *epidermis* brown, smooth, closely adhering, eroded chiefly in the incremental striæ ; *whorls* eight or eight and a half, slightly convex ; *suture* very distinct, impressed ; *spire* about three-fourths of the length of the shell, or slightly more, truncated at tip ; last whorl about one-third of the bulk of the spire ; on two or three of the last whorls may sometimes be seen an indistinct impressed revolving line, just below the suture, and also more rarely on the middle and lower part of the whorls ; *aperture* with its plane at an angle of about 16° with the length of the shell, sub-ovate, contracted above, broadly rounded below ; *labrum* rather thin, regularly arched, but more so in the lower half ; *columella* with a single, rather obtuse plait ; *labium* with a slight lamina, which is often obsolete ; no *umbilicus ; operculum* very small, thin, horny, nearly transparent, sub-triangular, apex on one side.

Length, .25 inch ; greatest breadth, .07 inch. Of the operculum ; length, .033 inch ; breadth, .025 inch.

Cabinets of Bost. Soc. Nat. Hist. ; of Middlebury College ; of Dr. A. A. Gould, of Boston ; of Prof. Hitchcock, of Amherst ; and my own.

Habitat. A cove on the east side of Fairhaven.

It was found near high-water mark, on a beach of fine gravel, but, as most of the shells were destitute of the animal, it may be doubted whether this is their proper station.

Remarks. This species was discovered in September, 1839, in company with great numbers of the *Venus gemma*, Totten, and many of the *Jaminia fusca*, Nob. It has a striking resemblance to the latter species, but is much more elongate, has two more whorls, the body whorl is much less inflated, and the suture is rather more deeply impressed.

Tornatella puncto-striata.

Plate III. Fig. 9.

T. testâ parvâ, ellipticâ, albâ, nitidâ ; anfractibus quinque convexis ; suturâ valdè impressâ ; anfractu ultimo suprà lævi, infrà puncto-striato ; aperturâ sub-ovatâ ; umbilico parvo.

Shell small, elliptic, white, glossy, not very thin ; *whorls* five, convex ; *suture* deeply impressed ; *spire* rapidly attenuated, sub-acutely tipped, four-ninths of the length of the shell, smooth ; *body-whorl* more than three-fourths of the shell, somewhat shouldered above, smooth on the upper third, below with impressed, parallel, punctate lines, five or six of them distant on the middle, either equally or unequally distant, and six to eight closely approximate on the lower fourth ; one line only appears above the aperture, running near and at length into the suture of the body-whorl ; *aperture* in the same plane with the axis, the line of its length making with the axis an angle of not more than 10°, five-ninths of the length of the shell, sub-ovate, contract-

ed above by the intrusion of the body-whorl, regularly but narrowly rounded below; *labrum* sharp, prominent, with a short, abrupt curve above, then straight to the middle, arched in the lower half; *columella* with an obtuse fold; *labium* moderately reflected below; *umbilicus* small, partly covered by the reflected labium.

Length, .16 inch; breadth, .095 inch: of a large specimen, length, .18 inch; breadth, .1 inch.

Cabinets of the Bost. Soc. of Nat. Hist.; of Mr. C. F. Shiverick; and my own.

Station and habitat; the same with *Pleurotoma plicata.*

REMARKS. In 1838 I found two specimens, after a violent storm, on the shore at New Bedford. Three specimens were found with the preceding species, and several have been obtained by Mr. Shiverick.

LIMNÆA PALLIDA.

Plate III. Fig. 13.

L. testâ ovato-fusiformi, pallidâ; anfractibus quinque; suturâ impressâ; spirâ conicâ, subacutâ; anfractu postremo producto; aperturâ supernè acutâ, haud magnâ; umbilico parvo.

Shell moderately elongate, ovate-fusiform, very pale horn color, semi-transparent, not very thin, with fine, irregular striæ of growth, without revolving striæ; *whorls* about five and a half, moderately convex; *suture* well impressed; *spire* four-ninths of the length of the shell, acutely conic, its opposite sides containing an angle of about 45°, sub-acute at tip; *body-whorl* not much enlarged, somewhat produced below; *aperture* five-ninths of the length of the

shell, sub-ovate acute above, angle of its plane with the axis of the shell about 15°, of its length with the axis about 10° ; *labrum* not thickened internally ; *fold* of the columella distinct, but not very large ; *umbilicus* rather small.

Length, .48 inch ; breadth, .22 inch.

Cabinets of the Bost. Soc. Nat. Hist. ; of Middlebury College ; of Dr. A. A. Gould, of Boston ; of J. G. Anthony, of Cincinnati ; and my own.

Habitat and station. This species was found in considerable numbers at Shoreham, Vt., on the shore of Lake Champlain, clinging to rocks and stones.

Remarks. This species must resemble *L. acuta*, Lea, of which, however, I have not seen a specimen. That shell, in a very brief description, is said to be delicate, smooth, and dark brown, while this is rather strong, striate, and of a very pale horn color, in living specimens, like the weathered shells of kindred species. The figure represents the columella of the *acuta* as intruding upon the aperture, which is not the case with this shell.

Limnæa umbilicata.

Plate III. Fig. 14.

L. testâ fuscâ, ovatâ, striis transversis tenuibus, volventibus tenuissimis ; anfractibus quinque, convexis ; spirâ subacutâ ; aperturâ ovatâ, labro intus fusco-marginato, puniceo-albo submarginato ; columellâ latè reflexâ, obsoletè plicatâ ; umbilico subamplo, haud profundo.

Shell rather strong, brown, ovate, with slight striæ of growth, and more slight numerous, irregular, revolving, impressed lines ; *whorls* five, convex ; *suture* deeply impressed ; *spire* two-fifths of the length of

the shell, conic, sub-acute at the apex, angle of its opposite sides about 65° ; *body-whorl* inflated, sub-globular ; *aperture* ovate, its plane, also the line of its length, at angles of about 15° with the axis of the shell, three-fifths as long as the shell ; *labrum* thin, inner margin dark brown, inner sub-margin thickened with a light pink deposit ; *columella* strong, reflected and spread over an *umbilicus*, which is rather large but not profound, and formed chiefly by the reflection of the columella ; *fold* of the latter inconspicuous.

Length, .28 inch ; breadth, .17 inch.

Cabinets of Bost. Soc. Nat. Hist. ; of Middlebury College ; of Mr. Shiverick ; and my own.

Habitat. New Bedford.

Remarks. For this species I am indebted to Mr. Shiverick, who obtained numerous specimens. It resembles *L. caperatus*, Say ; but in Say's species the aperture is but one half the length, the revolving lines are raised, more distinct, and numerous, the umbilicus is rather less, and there is one more whorl.

Planorbis virens.

Plate III. Fig. 15.

P. testâ parvâ, viridi, striis transversis crebris, volventibus tenuissimis ; anfractibus quatuor ; spirâ haud prominente, vix concavâ ; anfractu ultimo magno, supernè subplanulato, infernè subcarinato ; aperturâ suborbiculari ; labro supernè prominente ; umbilico sublato, profundo.

Shell small, greenish horn color, with thick, obvious striæ of growth, and very slight revolving lines, with a green, rough epidermis ; *whorls* four ; *suture* impressed ; *spire* not rising above the last whorl, but

scarcely falling below it; *last whorl* much larger than the spire, flattened above, then abruptly curving downwards, (in the young shell, at the upper third of the last whorl, is a carina, which is gradually modified into the abrupt curvature, in the progress of growth,) subcarinate below, as are also the preceding whorls; *aperture* nearly orbicular, interrupted by the last whorl in about one-fifth of its circumference, advancing above; *umbilicus* as broad as the last whorl, rather deep, exhibiting all the volutions.

Height (of the last whorl), .09 inch; greatest breadth, .23 inch; least breadth, .18 inch.

Cabinets of the Bost. Soc. Nat. Hist.; of Middlebury College; of Mr. Shiverick; and my own.

Habitat. New Bedford.

Remarks. For this species I am indebted to Mr. Shiverick. It differs from *P. parvus*, Say, in being much less broadly and more deeply umbilicate beneath; it is also higher. *P. parvus*, also, instead of being subcarinate on the lower side of the whorls, is much flattened. *P. concavus*, Anthony, MSS., resembles this species, but is more regularly convex above and concave beneath.

Planorbis elevatus.

Plate III. Fig. 16.

P. testâ parvâ, pallidâ, suprà elevatâ, infrà altè umbilicatâ; anfractibus quatuor; suturâ valdè impressâ; aperturâ subrotundatâ; labro suprà prominente.

Shell horn color, finely striate; *whorls* four, as high as wide; last whorl well rounded, very indistinctly carinate below; *inclination* to the left about

48° ; *right side* convex, flattened at the apex ; *left side* very deeply concave ; *suture* deeply impressed ; *aperture* round-ovate, large, with its upper extending much beyond its lower margin.

Greatest breadth, .17 inch ; least breadth, .13 inch ; height, .06 inch.

Cabinets of Bost. Soc. Nat. Hist. ; of Middlebury College ; of S. S. Haldeman, of Marietta, Pa. ; of J. G. Anthony, of Cincinnati ; and my own.

Habitat. This species was discovered in the summer of 1838, in a small spring in a rocky cavity, in South Boston. Nearly a hundred specimens were obtained, and a much larger number were left. Visiting the same spot a few days since, (July, 1840,) I found the spring filled up with stones to the top of the water, and not a shell to be seen. Last summer I obtained a specimen in Lake George, N. Y. Dr. Wm. Prescott has found the species in Lynn.

Remarks. This species much resembles *P. parvus*, Say, and for some time I doubted whether it were distinct. But the specimens uniformly differ from that shell in having the spire elevated above the plane of the last whorl, whereas in that species it is concave, and consequently this species is much more deeply umbilicated on the left side ; also, that species is distinctly carinate on the middle of the last whorl, but is very indistinctly carinate below the middle, if at all.

ANCYLUS FUSCUS.

Plate III. Fig. 17.

A. testâ tenui, sub epidermide pellucidâ, subdepressâ, ellipticâ ; epidermide fuscâ, crassâ, asperâ, extra marginem prominente ; apice obtusâ, ad dextram, vix posterâ.

Shell thin, transparent without the epidermis, not much elevated, elliptical, moderately curved at the sides ; *epidermis* brown, visible through the shell, giving it the appearance of having the same color, thick, rough, slightly extending beyond the margin of the shell ; *apex* obtuse, moderately prominent, scarcely behind the middle, inclining to the right, so as to have only two-fifths of the width on that side.

Length, .31 inch ; width, .22 inch ; height, .05 inch.

Cabinets of Bost. Soc. Nat. Hist. ; of Mr. Kinne Prescott, of Andover ; and my own.

Habitat and station. This species was found adhering to stones, in a small rivulet, at Andover, by Mr. Kinne Prescott, to whom I am indebted for many interesting species of shells. It has also been found at Mansfield.

REMARKS. This species is easily distinguished by its epidermis. The *A. rivularis*, Say, differs also in being much more narrow, having its sides straight, and its apex more acute, and *A. tardus*,* Say, is more elevated, and in both of these the apex does not incline so far to the right as in our species. The *A. lacustris*, Drap., is more narrow, with an apex more

* This species, hitherto unknown in New England, occurs quite plentifully in a rivulet in Middlebury, Vt.

elevated and acute, and *A. fluviatilis*, Drap., has the apex more prominent and nearer one extremity.

Cyclas elegans.

Plate III. Fig. 11.

C. testâ bizonatâ, subglobosâ, rhombico-orbiculari, equilaterali, eleganter et tenuissimè striatâ ; natibus haud prominentibus ; umbonibus tenuibus ; intùs albido-cærulescente.

Shell sub-globular, rhombic-orbicular, equilateral, finely and elegantly striated, with a horny green *epidermis*, with a straw-colored marginal zone, of variable width, and another of the same color, and usually much narrower, and about equidistant between the margin and the beak, but varying somewhat in position ; *beaks* not prominent, slightly undulate, central, not decorticate ; *umbones* very thin ; *within* bluish white ; lateral *teeth* strongly developed, cardinal teeth rudimentary. The young shell has only a marginal zone, and is less inflated.

Length, .43 inch ; height, .36 inch ; width, .26 inch.

Habitat and station. This species was discovered by Mr. Kinne Prescott, in a swamp, in Weybridge, Vt. This swamp nearly surrounds an old Indian encampment, and is impassable. A considerable number of specimens were obtained with some difficulty and hazard. The species has been found at Burlington, Vt.

Cabinets of Bost. Soc. Nat. Hist. ; of Middlebury College ; of Dr. A. A. Gould ; of Messrs. Kinne Prescott and Luther H. Sheldon, of Andover ; and my own.

Remarks. This shell is remarkable for its fine

polish and for its inflation, which continues far over the disk of the shell, and terminates very abruptly, near the margin. The circumference very nearly represents that of the *C. calyculata*, Drap., except that it is less curved below. That shell, however, is flattish, and has prominent beaks. *C. rhomboida*, Say, approaches in form to this species, but is much less inflated between the umbo and margin, has very coarse striæ, and is destitute of the paler zones, which in this shell appear to be a constant character.

Pupa badia.

Plate III. Fig. 18.

P. testâ parvâ, rubro-fuscâ, cylindraceâ ; apice perobtusâ ; anfractibus septem, convexis ; aperturâ orbiculari, unidentatâ ; labro contracto, subreflexo.

Shell small, reddish brown, cylindrical, very obtusely tapering in the two upper whorls ; *whorls* seven, moderately convex, with a well impressed suture ; *aperture* orbicular, its plane nearly parallel with the axis of the shell, less than one third of the length of the shell, with the margin slightly reflected, and the sub-margin contracted, with a single rather small tooth on the penultimate whorl ; *umbilicus* moderate.

Length, .14 inch ; breadth, .07 inch ; diameter of the aperture, .045 inch.

Cabinet of the Bost. Soc. Nat. Hist.

Habitat. This species may not improperly be reckoned among the shells of New England, having been found within half a mile of the Vermont line. It was discovered at Crown Point, N. Y., by Prof. George W. Benedict, of the University of Vermont.

Remarks. This species is readily distinguished by its dark mahogany color. The only native species, which, to my knowledge, resembles this in form, is *P. armifera*, Say, which, however, is white, and has numerous teeth. *

ART. IX.—DESCRIPTION OF *TELLINA TENTA*, SAY, AND OF *HELIX SERPULOIDES*, MONTAGU, WITH REMARKS ON OTHER MARINE SHELLS OF MASSACHUSETTS.

By C. B. Adams, Member of the Bost. Soc. Nat. Hist., Prof. Chem. and Nat. Hist. in Middlebury College, Vt.

Tellina tenta.

Synonyme. Tellina tenta ; Say, American Conchology, No. VIII. pl. 65, fig. 3.

T. testâ tenui, albâ, dextrorsim deflectâ ; valvâ sinistrâ valdè convexâ , epidermide tenui ; margine dorsali postremè depressâ, anteriùs elevato ; margine anteriori infrà rotundato, posteriori subtruncato.

Shell rather small, thin, white, widely gaping posteriorly, with irregular, incremental striæ, inequilateral, with the posterior portion two-thirds of the length and one-half of the superficies of the anterior portion ; left valve very convex ; both valves much deflected by the fold to the right ; *epidermis* very thin, membranous, dingy white ; *beaks* rather prominent ; *lunule* elevated; *corselet* suddenly depressed ; *margin* regularly rounded anteriorly and below, or sometimes sub-rectilinear below, sub-truncate posteriorly ; *shell internally* white, dingy beneath the umbo, radiated with faint impressed lines ; *hinge* with lateral teeth, and two erect, prominent, obtuse, inferiorly diverging cardinal teeth on the right valve, and on the left

* Erratum. In the title of Article VIII., p. 318, for *Thirteen* read *Eleven*.

valve one erect, very prominent cardinal tooth ; anterior *muscular impression* round-ovate, posterior one elongate ; *pallial impression* with a very large posterior sinus.

Length, .62 inch ; height, .38 inch ; width, .21 inch. Of some large valves in the cabinet of Mr. Shiverick, length, .8 inch ; height, .45 inch.

Cabinets of Bost. Soc. Nat. Hist. ; of Middlebury College ; of Mr. Shiverick, of New Bedford ; and my own.

Habitat and station. This species inhabits soft mud, in deep water, in harbours, and has been obtained only by dredging. It has been found in New Bedford and Dartmouth harbours. Inhabits the coast of S. Carolina : *Dr. Ravenel.*

Remarks. A single living specimen was found in the summer of 1838, and during the autumn of 1839 numerous single valves were found in mud dredged in New Bedford harbour. Mr. Shiverick has also found a living specimen.

The faint radiating lines of the interior sometimes appear very indistinctly on the outside. *T. intastriata*, Say, differs in having the posterior margin rounded, being without lateral teeth, and is of much greater size (2.06 inches by 1.6 inch), while, among hundreds of single valves of this shell, none exceeded the size given.*

* After writing the above description, Dr. Gould kindly favored me with the loan of No. VIII. of Say's " American Conchology," in which this species is described and figured. That Number is so rarely seen, that a description in this Journal cannot be superfluous.

DELPHINULA (?) SERPULOIDES.

Synonymes. *Helix serpuloides*; Montagu, Test. Brit. Sup. p. 147; tab. 21, fig. 3. *Turbo serpuloides*; Turton, Conch. Dict. p. 228. *Delphinoidea serpuloides*; Brown's Plates, pl. 51, fig. 40, 41.

D. testâ minimâ, sublævi; anfractibus rotundis, tribus; suturâ amplâ, valdè impressâ; aperturâ orbiculari; labro anticè producto, tenui; umbilico profundo.

Shell diaphanous, reddish brown or horn color, smooth, not shining; *apex* obtuse; *whorls* a little more than three; body-whorl constituting about four-fifths of the shell; margins of the *aperture* thin, simple, separate from the body-whorl; *labrum* extending forwards so far, that, if the plane of the aperture were produced, the axis of the shell would fall wholly within it; *umbilicus* profound.

Length, .03 inch; least breadth, .055 inch; greatest breadth, .07 inch.

Operculum horny, thin, lamellar, orbicular, subspiral, fitting; laminæ concentric; diameter, .03 inch.

Cabinets of Bost. Soc. Nat. Hist.; of Middlebury College; of George B. Emerson, Esq., Boston; of J. W. Mighels, M. D., Portland; of J. G. Anthony, Cincinnati; and my own.

June 7th, 1838, this shell was found quite plentifully at East Boston, in company with *Turbo aculeus*, Gould, and *Jaminia exigua*, Couth., clinging to smooth stones, which were lying in the mud near low water mark. This spot has since been covered by the construction of Cunard Street. A few individuals have been found elsewhere at East Boston. I

have a single specimen found at Lynn, by Dr. Wm. Prescott, and have recently seen it, rarely occurring, at Portland, with the same station as in this harbour, and in company with *Turbo aculeus.*

This species is referred, with some hesitation, to the genus Delphinula, on account of the following generic characters: shell subdiscoidal, depressed, broadly umbilicated; spire slightly elevated; whorls rounded, separated by a broad and deep suture; aperture orbicular; margins perfectly continuous; operculum horny, thin, concentric, subspiral, orbicular, with concentric elements. The last whorl is also, as in all the species of this genus, much larger than the remainder of the shell. This species is, however, thin, destitute of raised or impressed markings, has the margins of the aperture thin, and is extremely small. The characters, which thus separate it from the other species of this genus, can scarcely be entitled to generic rank, unless subsequent examination should find a generic difference in the animal.

Although this species is well figured by Montagu, and briefly described by this author and by Turton, I have thought that a new description of a species, which is the least of all our marine shells, not even excepting *Turbo aculeus*, and whose generic place is a matter of some uncertainty, would not be wholly without interest.

Cerithium Emersonii. Nob. Journ. of this Soc., Vol. II. p. 284. This species is very nearly allied to the *Murex tubercularis* of Montagu, but differs in several characters. The *M. tubercularis* has only

nine or ten whorls, and is but a quarter of an inch long; but our species has sixteen whorls, and is six tenths of an inch in length. Montagu remarks in his Supplement, that, as an invariable character, the *M. tubercularis* has three series of tubercles of equal size on each volution. Turton's description coincides with this remark. But, in the *C. Emersonii*, the middle series does not appear at all until after ten volutions (the whole number in the English shell), and is always much less than the outer two.

Since this species was described, it has been found in a bed of mud in the harbour of New Bedford. None of these individuals were in a fresh condition, and the majority of them had lost most of their color and gelatine. Six-tenths of an inch is a common length. Mr. Shiverick has found, in New Bedford and Dartmouth, a few specimens, one of which is .8 inch in length, and .17 inch in breadth.*

Cerithium nigrocinctum. Nob. Journ. of this Soc., Vol. II. p. 286. Since this species was described, it has been found in the harbour of New Bedford, and in a cove on the east side of Fairhaven. It should be remarked, that the color of the black sutural ridge is much more obvious, when exposure after the death of the animal has rendered the other parts cinereous.

Cerithium Greenii. Nob. Journ. of this Soc., Vol.

* Dr. Jay, in the third edition of his Catalogue, mentions Massachusetts Bay as its habitat, but this is probably an error. I am not aware that it has yet been found out of the harbour of New Bedford. The reference to *Adans.*, as the original describer, is obviously an error of the printer.

II. p. 287. This species has been found in considerable numbers in the harbour of Dartmouth, during the past summer, (1840). It is much less in size than any other species of this genus on our shores. When young, the shell does not appear fusiform, and unfortunately the figure was drawn from such a specimen. It has also been found in New Bedford harbour.

Jaminia seminuda. Nob. Journ. of this Soc., Vol. II. p. 280. Of this species I have not been able to obtain any more living individuals, but have found it in considerable numbers in a bed of mud, in New Bedford harbour. All the specimens were more or less cretaceous from decay. Some of them exceed .22 inch in length.

Jaminia fusca. Nob. *Pyramis fusca,* Nob. Journ. of this Soc., Vol. II. p. 282. At Fairhaven, in a cove east of the town, this species is sometimes found abundantly, in company with the *Jaminia producta,* Nob. Many of the specimens are larger than those from which the description was written. Some are .25 inch long, and .1 broad.

Dr. Gould has pointed out to me an obtuse fold on the columella. In many individuals this fold cannot be seen distinctly without removing a portion of the labrum, and it therefore escaped observation. The species should be referred to the genus Jaminia. The several species, *J. exigua,* Couth., *J. seminuda, J. fusca, J. producta,* and *Actæon trifidus,* Totten, all evidently belong to the same genus. Unfortunately, the only knowledge, which we have been

able to obtain of this genus, is from a series of figures in the plates of Brown, who quotes Bruguière for the genus.

ART. X. — DESCRIPTIONS OF THE FISHES OF THE OHIO RIVER AND ITS TRIBUTARIES. By JARED P. KIRTLAND, Professor of the Theory and Practice of Medicine in the Medical College of Ohio, at Cincinnati. Communicated September, 1839, and afterwards.*

Cleveland, Sept. 20th, 1839.

To the Boston Society of Natural History.

During my connexion with the Geological Board of Ohio, in the capacity of Zoologist, I directed some attention to the fishes of the Western waters. The legislature of our state, changing its policy, discontinued our operations before any of the members of the Board had perfected his labors.

In the report I was unexpectedly called upon to make, I included a list of seventy-two species of Fishes, as inhabiting the waters of the Ohio River and Lake Erie, and their tributaries, within the bounds of the State of Ohio.

Further investigations have enabled me to correct

* The Publishing Committee of the Society take great pleasure in stating, that they have already received descriptions, accompanied with plates, of fifty species of Western fishes. It is their intention to publish all these, together with such others as Dr. Kirtland may be enabled to furnish, in this work; thus presenting a full Ichthyology of the Western waters. The descriptions will be published in the order in which they have been received, as they are not yet completed. This will at once explain, why all the different species are not comprised under their appropriate genera, in the same paper.

that list, by expunging several that prove not to be true species, and adding others that had escaped previous observation.

I have prepared drawings and descriptions of about one third of the number, and I take the liberty of forwarding several of them to you, for your disposal in such manner as you may deem proper. The arrangement of my business is such, that I am required to spend the winters at Cincinnati, and the summers in Cleveland. This will enable me to pursue the subject in future with great facility, and I hope to continue my efforts till I shall complete full descriptions and delineations of all the fishes of the Western waters. Very respectfully yours,

Jared P. Kirkland.

Luxilus. Raf.

L. *elongatus.* Kirtland. The Red-bellied Shiner (of the Lake).

Luxilus elongatus. Kirtland's Report on the Zoology of Ohio, pp. 169, 192.

Plate IV. Fig. 1.

Head elongated, upper jaw slightly recurved, forehead flat, lower jaw prominent, projecting. *Eyes* large, irides silvery. Operculum terminating posteriorly in an acute angle.

Body long, slim, particularly elongated between the caudal and dorsal fins; cylindrical, slightly compressed on its sides.

Dorsal fin, high and narrow.

Caudal fin, bifurcated and elongated.

Anal fin, posterior to the dorsal. Vent postmedial.

Lateral line, at its base is on a level with the eye, but rapidly curves down to the middle of the body in an undulating manner.

Color. Back a beautiful sky-blue, edged below with a band of gilt; below this, is an interrupted band of black, extending from the point of the upper jaw to the tail, passing through the iris of the eye, but broken by a carmine, or, in others, a vermilion stripe, from the operculum, extending back upon the medial line one inch, and terminating above the end of the ventral fin in an acute point. *Sides* and *belly* silvery.

Length, 3 inches. The rays are, D. 8; A. 9; C. 20; P. ?

Hab. tributaries of Lake Erie near Cleveland, and of the Mahoning in Trumbull County.

Observations. In the year 1820, Professor Rafinesque published, in Lexington, Kentucky, his "Ichthyologia Ohiensis." As the circulation of this volume has been very limited, and it cannot readily be procured, I have thought it advisable, whenever a genus of Rafinesque's is referred to, to give its characters, that it may be recognised; and shall, therefore, pursue this course throughout this communication. The genus Luxilus was established to receive several species which it was thought advisable to separate from the genus Leuciscus (Klein.), and its characteristics are as follows: — "Body elongated, somewhat compressed, with rather large scales. Vent posterior, or nearer to the tail. Head flat above,

and somewhat shielded. Mouth rather large, commonly with lips and equal jaws. Preopercule with an angular suture. A small trapezoidal dorsal fin, nearer to the head than to the tail, opposite to the abdominal fins, and without spines. Abdominal fins with eight rays, and without appendages. (Tail forked in all the Ohio species.)"

The species here described, was first pointed out to me by an old fisherman at Cleveland. It is readily distinguished from the Luxilus *erythrogaster* of Raf., by its much greater length, the form of the fins, and its coloring. It is also more active in its habits. The brilliancy of its colors will fade, if confined for a few days in a globe of water.

I have known these fishes to destroy themselves by leaping from a globe of water, placed for observation in my study, and have not unfrequently seen them throw themselves above the surface of the water four or five inches, apparently for mere sport.

L. *dissimilis*. Kirtland. The Spotted Shiner.
Plate IV. Fig. 2.

Head flat between the eyes. Nose prominent, fleshy, and projecting. Lower lip slightly fleshy, recurved. *Eyes* large and prominent; irides yellow.

Body slim, cylindric, elongated, gradually tapering from the ventral to the caudal fins; vent behind the centre of the body.

Dorsal and *ventral* fins opposite each other; the latter reaching the vent.

Pectorals horizontal; not reaching the ventrals.

Lateral line hardly curved.

Color. Back brownish or olive, a belt of gilt along the lateral line, with about twelve bluish dots, which enlarge towards the tail; an ochrey band runs along the back, which is faintly marked with darker spots. *Abdomen* white and silvery. *Fins* pale, rays slightly marked with dark tints.

Length 4½ inches.

Hab. Mahoning river and Lake Erie.

D. 8 or 9; C. 20; A. 7; V. 8; P. ?

Observations. Two specimens were brought me by an experienced fisherman, who informed me, that they were never seen in the Mahoning till the last year. I have since found several dead specimens upon the shore of Lake Erie, near Cleveland. It is questionable whether this fish should be placed under the genus *Luxilus*. It has the habits of that family, and the position of the vent and the angular suture of the preoperculum would seem to refer it there; but the form and structure of its mouth would perhaps refer it to Rafinesque's genus *Hypentelium*, or to the genus *Catostomus*.

It readily bites at a hook, and is employed with minnows to bait the hook on "*sett lines.*"

PETROMYZON. Lin.

P. *argenteus.* Kirtland. The Lamprey.

Petromyzon argenteus. **Kirtl. Rep. on the Zool. of Ohio, pp. 170, 197.**

Plate IV. Fig. 3.

Head elongated, depressed before the eyes, slightly convex above them. *Eyes* minute, pupils very small

and black; irides silvery, not conspicuous. *Mouth* oval, concave, with series of inflected teeth regularly radiated from the circular opening of the fauces, and a distinct line of teeth surrounding the lower fourth of the same opening; the inner teeth of the radiated series the largest. *Chin*, a triangular depression.

Branchial openings seven, with a corresponding black dot above each; each opening larger than the eye.

Body cylindrical, compressed towards the back.

Dorsal fin two fifths the length of the fish; depressed, but not interrupted above and anterior to the vent, then continuous as the caudal fin, and extending beneath the tail along its carinated edge, one inch; its caudal portion flattened and narrowed towards the tip.

Color. Back ash-gray; sides and beneath, silvery gray, maculated with irregular rows of black dots.

Length 11 inches; widest diameter of the body nine-tenths of an inch.

Hab. Big Miami.

Observations. This species is readily distinguished, from the P. *Americanus* and the *nigricans* of Les., and the *nigrum* of Raf. My specimen was found attached to the side of a large Ohio salmon (Lucio-Perca *Americana*). This species is of a larger size in Lake Erie than in the river Ohio.

SEMOTILUS. Raf.

S. *biguttatus.* Kirtland. The Two-spotted Chub.

Plate V. Fig. 1.

Head subquadrangular, upper surface flattish; *upper lip* prominent and projecting; *nostrils* double, equal distance between the eye and the point of the upper jaw; *eyes* not large, circular; *irides* silvery; *gill-covers* smooth and iridescent.

Body fusiform, cylindrical; *scales* large; *medial line* suddenly curves upwards near its base.

Color. Body olive and bluish above the medial line; sides and abdomen faintly cupreous. *Fins* orange, ferruginous colored; a black spot at the base of the caudal fin, but none in the dorsal. *Body* and *fins* irregularly punctated with small black dots, and a larger vermilion dot behind each eye.

Length 6 inches.

Hab. Yellow Creek, a tributary of the Mahoning.

Observations. The elongated form of the head, the vermilion dots behind the eye, and the absence of a brown or black spot in the dorsal fin, as well as its peculiar habits, distinguish it from the S. *dorsalis* of Raf., which is also common in the same locality.

The older individuals, especially the males, have the upper surface of the head and superior jaw studded with numerous spines, in the spring of the year; these are deciduous, and fall off by mid-summer, leaving those surfaces smooth.

This species bites at the hook with as much energy and as suddenly as the *speckled trout*, and hence the fishermen and boys have given him the name of *Jerker*.

The genus Semotilus was established by Rafinesque, to include such of the Cyprinidæ as could not be arranged in existing genera. The characters of the genus are as follows. "Body elongated, somewhat compressed, with rather large scales. Vent posterior, or nearer to the tail. Head flat above, and somewhat shielded. Gill-cover double, scaleless; three branchial rays. Mouth large and with lips. Preoperculum angular. Dorsal fin posterior, opposite to the vent, and behind the abdominal fins. Abdominal fins with eight rays, and without appendages."

S. *cephalus.* Raf. The Horned Chub.

Semotilus cephalus. Rafinesque's Ichthyologia Ohiensis. p. 49.
Semotilus cephalus. Kirtl. Rep. on the Zool. of Ohio. Catalogue, p. 169.

Plate V. Fig. 2.

"Diameter one fifth of the total length: silvery, back brownish, lateral line raised upwards at the base: fins fulvous; the pectorals reddish; the caudal pale at the end and unspotted; the dorsal with 9 rays, and a large black spot at the anterior base; anal with 9 rays.

"Length from 6 to 8 inches. Not uncommon in the creeks of Kentucky, &c. Vulgar names, Chub, Big-mouth, and Big-head. It has really the largest head and mouth of this tribe. Iris reddish, iridescent. Pectoral fins with 15 rays, trapezoidal and short; abdominal fins rounded, dorsal fin beginning over them. Spot round. Tail with 20 rays."

The foregoing is Rafinesque's description. It is correct in every particular, except that, in a few in-

stances, the base of the caudal fin is marked like the dorsal, with a round black or olive spot, as was the case with the specimen from which the drawing was made. It is also difficult to say, whether the dorsal has 9 or 10 rays.

A faint vermilion spot may sometimes be seen, near the edge of the gill-covers, but much more posteriorly than on the *biguttatus.* The upper surface of the head and superior jaw is often ornamented with prominent spines, varying in height and number in different individuals.

Hab. Mahoning river.

Observation. It is one of the most abundant species in our waters, and bites readily at the hook.

Etheostoma. Raf.

E. *caprodes.* Raf. The common Hog-Fish.

Etheostoma caprodes. Raf. Ichth. Ohiens. p. 38.
Etheostoma caprodes. Kirtl. Rep. on the Zool. of Ohio. pp. 168, 192.

Plate V. Fig. 3.

"Body quite cylindrical, whitish, with about twenty transverse bands, alternately shorter. Head elongate, obtuse; upper jaw longer, rounded; opercle angular; spine acute; lateral line quite straight; diameter one eighth of the length; tail forked, olivaceous, brown at the base, and with a black dot. Vent anterior.

"The most common species found in the Ohio, Cumberland, Wabash, Tennessee, Green river, Kentucky, Licking, Miami, &c.; called almost everywhere, Hog-Fish. Length from two to six inches. Scales rough upwards, hardly ciliate. Mouth be-

neath, small; upper jaw protruding, like a hog's snout, the nostrils being on it. Eyes jutting, black; iris silvery. Sides of the head silvery, above fulvous; preopercule simply arched. Branchial rays half visible. Fins hyalinous; dorsal 15 and 12, ending before the anal, which is very distant from the tail, rays 2 and 10. Pectoral fins trapezoidal, 16. Tail, 24."

Observations. Prof. Rafinesque's description of this species, which we have copied above, is essentially correct. In the specimens I have examined, however, the fin rays were as follows. D. 15 – 16; C. 17; P. 14; V. 1 – 5; A. 13.

The color varies from a ferruginous yellow to a deep green. The irides are golden-yellow, when first taken from the water, but soon fade to a silvery, and then a dusky color. This is the largest species of the genus with which I am acquainted, some specimens exceeding six inches in length. It is abundant in the Mahoning river, where it is taken with hooks. The genus Etheostoma is thus characterized. "Body nearly cylindrical and scaly. Mouth variable, with small teeth. Gill-cover double or triple, unserrate, with a spine on the opercule, and without scales; six branchial rays. Thoracic fins with six rays, one of which is spiny; no appendage. One dorsal fin more or less divided into two parts, the anterior one with entirely spiny rays. Vent medial, or rather anterior."

E. *blennioides.* Raf. The Blenny-like Hog-Fish.

Etheostoma blennioides. Raf. Icth. Ohiens. p. 37.
Etheostoma blennioides. Kirtl. Rep. on the Zool. of Ohio. p. 168.

Plate VI. Fig. 1.

" Body elongate, breadth one eighth of the length, olivaceous, almost diaphanous, some brown spots on the back, and some brown geminate transversal lines across the lateral line, which is straight, but raised at the base. Head small, snout rounded, mouth small beneath, lower jaw shorter; opercule angular, spine acute; scales ciliated, pectoral fins elongate, tail also, and bilobed at the end.

" A strange species, which has the appearance, head, and spots of many Blennies. Length two or three inches, and slender. Seen in the Ohio, Wabash, Muskingum, &c. Color pale, sometimes fulvous, whitish beneath. Cheeks swelled and smooth; pre-opercule simple, arched; opercule quite angular; iris large and blackish; scales roughened by the ciliation. Dorsal fin 13 and 13, beginning above the middle of the pectorals, and ending with the anal; one faint longitudinal brown stripe on it. Tail 20 rays, with many small transversal lines. Vent medial. Anal fin 2 and 8. Pectoral fins, 16, oblong, acute."

This description, copied from Rafinesque's "Ichthyologia Ohiensis," is quite accurate. The fins of the specimens I have seen, have the following number of rays. D. 15 – 13; C. 13; A. 2 – 9; V. 1 – 5.

Observations. This fish is abundant in the Mahoning river. A popular error is common among the fishermen, that it is the young of the Ohio salmon.

Its habits are like those of the other members of the family.

CATOSTOMUS. Le Sueur.

C. *aureolus*. Le Sueur. The Mullet of the Lake.

Catostomus aureolus. Le Sueur. Journal of the Academy of Natural Sciences. Vol. I. p. 95 et seq.
Catostomus aureolus. Kirtl. Rep. on the Zool. of Ohio. pp. 169, 192.

Plate VI. Fig. 2.

Le Sueur's description of this species, which is very accurate, we extract from the Journal of the Philadelphia Academy.

" *Anal fin* long, pointed, and passing considerably beyond the base of the *caudal fin*, which is forked, with pointed lobes, the inferior of which is the largest ; *abdominal fin* truncated.

" *Body* subcylindric, elevated at the nape ; *head* quadrangular, gibbous above the eye, almost as high as long ; the rays of the anal fin are very strong and large ; *scales* rhomboidal, equal ; *body* of a beautiful orange color, which is deepest on the back, the base of the scales dark red ; the *sides* are heightened with golden reflections ; *pectoral*, *ventral*, and *anal fins* of a fine red orange ; *caudal fin* of a deep carmine color ; the *dorsal fin* is paler than the rest ; the *lateral line* is nearly straight, and commences in a line with the eye. Length of individual described, sixteen inches, its depth three inches, and its thickness two inches and a half.

P. 18 ; D. 14 ; V. 9 ; A. 8 ; C. 18 rays.

This beautiful species I discovered near Buffalo, on Lake Erie."

Observations. From the above description, we should expect to find the colorings more brilliant than any I have seen. Through inadvertence the eyes in our figure are represented as *circular*, — they should have been *oblong*, — as in all the other species of this genus. This fish is common at Cleveland, but is very little esteemed for food.

Corvina. Cuv.

C. *oscula.* Le Sueur. The White Perch of the Ohio River.

Corvina oscula. Cuv. et Valenc. Histoire Nat. des Poissons. t. V. p. 98.

Corvina oscula. Richardson, Fauna Boreali-Americana. Fishes. p. 68.

Sciæna oscula. Le Sueur, Journ. Acad. Nat. Sciences. Vol. II. p. 252, et fig.

S. oscula. Kirtl. Rep. on the Zool. of Ohio. pp. 168, 192.

S. grisea. Le Sueur, Journ. Acad. Nat. Sciences. Vol. II. p. 254.

Amplodon grunniens. Raf. Ichth. Ohiens. p. 24.

Plate VI. Fig. 3.

Le Sueur's description of this species, we copy entire.

" *S. oscula.* Second dorsal long, elevated, equal; tail short; neck prominent; scales soft.

" *Body* sub-elliptic, compressed towards the back, broader at the abdomen; back elevated rectilinear; *head* much declining; *snout* small, rounded, a little prominent, with three small openings at the end; *mouth* very small, horizontal, having the superior maxillaries and the inferior jaws concealed under the inferior corners of the nostrils; teeth very small, conic, the exterior series a little stronger, those of

the throat rude, obtuse, placed upon a triangular base, the strongest being in the middle, and the weakest on the sides, and upon two bones separately placed at the superior part of the throat; the *eye* is round, placed near the end of the snout, and very near the summit of the head; *preoperculum* larger than the operculum, with serratures hardly sensible, on the preoperculum, the other pieces being destitute of spines; *dorsal fins* sub-equal in height, the first rounded anteriorly, and lower towards the three last rays, all of which are strong and spinous, and imbricated to lie close upon the back; the second dorsal is very high and equal in its length, sustained by from twenty-nine to thirty soft and much divided rays, of which the first is spinous; the base of the rays of this fin, and of the caudal, are covered with scales; *pectorals* moderately pointed; *thoracic fins* adorned with a strong spinous ray; *anal* moderate, of seven divided rays and two spines, of which the first is very short, the second strong and very long; *caudal* sub-truncated, wider than the abdomen; *scales* oblique, shorter than broad, and slightly denticulated, without being rough to the touch, crowded towards the neck above the pectorals, larger upon the opercula, the sides of the body, and upon the tail; the color of the head, snout, and caudal fin was of a bluish gray, drawing upon black upon the snout and above the eyes, more gray towards the back and above the pectorals; all the other fins are of a lighter gray; there were some red tints upon the cheeks, a yellowish reflection upon the scales of the back of the tail, and of the opercula; the abdomen, beneath the throat was white; *lateral line* arcuated.

" Length sixteen inches, by about four inches and a half in depth.

" B. 7; P. 19; D. 9. 30; T. 1. 5; A. 2. 7; C. 18. 5–5.

" This species inhabits Lake Erie."

Observations. After a careful examination, I am convinced that the fish of the Lakes, which Le Sueur designates as the S. *oscula*, and that of the Ohio, to which he gives the name of S. *grisea*, are specifically identical. It is true, that the former when full grown, is poor in flesh, with a tough and thick skin, which renders it hardly eatable, while the latter is always fat, tender, and delicious; a difference, I believe, to be imputed solely to the character and quality of the waters in which they are found. All the species of fish common to the waters of the Ohio and to Lake Erie, are decidedly more tender, fat, and delicate, with thinner skins, when found in the river streams, than when taken in the Lake. The variation in the number of rays in the fins of those from the two localities, observed by Le Sueur, was probably accidental; for I find that it often can be detected in several specimens taken in the same locality.

Our drawing was made from a small fish obtained in the Cincinnati market. The first, short, spinous, anal ray, should not have been omitted in the figure.

(To be continued.)

ART. XI. — A MONOGRAPH OF THE HELICES INHABITING THE UNITED STATES. By Amos Binney, M. D. (Continued from Vol. I. p. 495.)

11. HELIX PALLIATA.

Plate VII.

H. testâ orbiculato-depressâ, imperforatâ, castaneâ, hirsutâ; anfractibus minutè striatis; aperturâ angustâ, trilobatâ; labro albo, latè reflexo, dentibus duobus instructo; columellâ dente unico, sub-arcuato armatâ.

Synonyms and References.

Helix palliàta, *Say. Journ. A. N. S. Philad.*, II. 152.
Helix obstrícta, *Say. Ibid.*, II. 154.
Helix denotàta, *Férussac. Hist. &c. Pl.* xlix., *A. fig.* 5. *Pl.* l., *A. fig.* 7.
Lamarck. Anim. sans Vert., *2me edit.*, VIII. 115.
Helix Carolinénsis, *Lea. Trans. Am. Phil. Soc.*, *N. S.*, IV. 108. *Pl.* xv., *fig.* 33.
Carocolla helicóides, *Lea. Ibid.*, *N. S.*, IV. 159. *Pl.* xv., *fig.* 34.
Triodopsis scàbra, *Rafinesque.*

Description.

Animal. Of a uniform blackish slate color, over the whole upper surface; foot narrow, in length double the diameter of the shell, and terminating in an acute point; superior tentaculæ one-third of an inch long; eyes not distinguishable from the general color.

Shell. Depressed ; *epidermis* dark-brown or chestnut color, and rough with minute acute projections and stiff hairs ; *whorls* five, flattened above and rounded below, with numerous very fine oblique striæ ; *aperture* three-lobed, much contracted by the lip and teeth ; *lip* white, sometimes edged with brown, widely reflected, with two projecting teeth on the inner margin ; the one near its junction with the body-whorl, acute and prominent, the other in the base of the aperture, long, lamellar, and but little prominent ; *pillar-lip* with a very prominent, white, curved tooth, projecting nearly perpendicularly from the shell, and forming one boundary of the aperture ; *umbilicus* covered with a white callus, the continuation of the reflected lip ; *base* convex.

Greatest transverse diameter, nearly one inch.

Geographical Distribution. Inhabits all the Northern and Western States, and the Atlantic States as far south as South Carolina, and probably may be found in every State of the Union, and in Canada. It is most common in the Western States, where it attains its greatest size.

Remarks. This is a remarkable species, easily distinguished from every other by its rough, hairy exterior, prominent falciform tooth on the columella, and contracted, trilobate aperture. As in all other imperforate species with reflected lips, the umbilicus remains open until the lip is completed, and of course the young shells are destitute of the most striking characteristics as above described. It resembles H. *tridentata*, Say, in its upper surface so much, that, when placed side by side, they might be considered

identical; but on the lower surface the resemblance no longer holds, for, though the aperture is nearly the same, the umbilicus of that species is never closed, and it never attains the size of the present species. Varieties of the type are caused by the absence of the upper or lower lip-tooth, or of both, the want of the raised projections of the epidermis, and of the transverse striæ, and by the great depression of the spire in some individuals, which produces a distinct angle or carina on the outer whorl. This last variation, which brings it within the genus Carocólla of Lamarck, is found in other species, especially in their immature state, and shows that the distinctive characters of that genus are not to be depended on.

A carinated variety, which was noticed by Mr. Say as "*a variety with a very prominent acute carina, destitute of minute protuberances*," has been described by Mr. Lea as Carocolla *helicöides.* The same was figured by Férussac, Pl. 50, A. fig. 7. A strongly carinated variety, with a single tooth on the outer lip, and smooth epidermis, was described by Mr. Say as H. *obstrícta.* Another variety, having the oblique striæ widely separated and very distinct, and being at the same time carinated, has been described by Mr. Lea as H. *Carolinénsis.* An examination of the specimens from which these descriptions were made, has convinced me that they are only varieties.

Mr. Say's description was published in January, 1821, and the shell has been known in the United States by the name of H. *palliàta,* since that time.

In 1822, the name of H. *denotata* was applied to it by Férussac. The editors of the new edition of Lamarck's *Animaux sans Vertèbres*, have chosen to retain the latter name; but, inasmuch as it is inconsistent with the rules of priority adopted by naturalists, and unjust to Mr. Say, it ought not to obtain.

12. HELIX APPRESSA.

Plate VIII.

H. testâ orbiculato-depressâ, imperforatâ, luteo-corneâ; anfractibus obliquè striatis; apertura angustâ; labro albo, sub-dentato, margine reflexo; columellâ dente unico arcuato armatâ.

Synonyms and References.

Helix appréssa, *Say*. *Journ. A. N. S. Philad.*, II. 154.

Helix linguífera, *Férussac*. *Hist. des Moll.* *Pl.* XLIX., *A. fig.* 3.

Lamarck. *An. sans Vert.*, *2d edit.*, VIII. 70.

Deshayes. *Encyc. Méth.*, *Vers*, II. 224.

Description.

Animal. Uniform blackish slate color, and resembling in all respects the animal of Helix *palliata*.

Shell depressed; *epidermis* yellowish horn color; *whorls* five, often somewhat angulated, with fine distinct transverse striæ; *aperture* rather flattened, contracted; *lip* white, reflected, near the base appressed to the body-whorl, and covering the umbilicus, with one, or two, or without projecting teeth on its inner edge; *pillar-lip* with an oblique, compressed, white tooth; *base* convex; *umbilical region* slightly indented.

Greatest transverse diameter, less than three-fourths of an inch.

Geographical Distribution. Inhabits all the Western and Southwestern States.

Remarks. I consider this species not to be well established. The description of Mr. Say hardly points out any difference between it and the preceding, and accordingly varieties of H. *palliàta* are commonly seen in cabinets labelled as H. *appréssa.* Well marked specimens of the two are very unlike, but they approach each other by nice and hardly appreciable shades of difference, until they at length seem to blend into one. It is impossible to say how far the characters of shells are modified by the accident of their locality and other causes ; but that they are so to a considerable degree is certain, and it appears to me that the differences between this and the preceding species, are not greater than might be produced by the influence of external circumstances. The shell intended to be described is very common in the Western and Southwestern States, is usually only about half as large as H. *palliàta*, and considerably more flattened in shape. It has a smooth and shining epidermis, without the hirsute projections, and is finely striated. The lip is narrower and less broadly expanded, the aperture much less contracted, and the tooth on the pillar-lip less prominent and thick than in that species. The teeth on the outer lip are sometimes entirely wanting, at other times very distinct ; sometimes the upper and sometimes the lower one is alone present. The smaller sized specimens resemble considerably Helix *inflecta*, Say, and it seems

almost to form a connecting link between that species and H. *palliàta.* The larger specimens are hardly inferior in size to individuals of the last-named species, which they closely resemble. Large specimens, without teeth on the outer lip, also resemble the species which I have called Helix *dentífera*, but that species never has the lip teeth, and is not so much depressed. A favorite place of resort of this species is under flat stones about neglected quarries.

The first publication of a description of this shell was by Mr. Say, in the place referred to, in 1821; the next year a second appeared, by Lamarck, in the first edition of his *Animaux sans Vertèbres*, under the name of Helix *linguífera*, reference being made to Férussac's *Histoire des Mollusques*, which was not then published. Mr. Say's name ought therefore to be preferred.

13. HELIX INFLECTA.

Plate IX. fig. 1.

H. testâ orbiculato-depressâ, imperforatâ, corneo-lutescente, rarè hirsutâ; anfractibus striatis, striis minutis, obliquis; aperturâ angustissimâ, trilobatâ; labro albo, dentibus duobus, acutis, inflectis, armato; margine reflexo; regione umbilicali impressâ; dente albo, arcuato ad columellam affixo.

Synonyms and References.

Helix inflécta, *Say. Journ. A. N. S. Philad.*, II. 153.
Helix clausa, *Férussac. Hist. des Moll. Pl.* LI., *fig.* 2 *and* 3. ?
Deshayes. Encyc. Méth., Vers, II. 230.

Helix clausa, *Lamarck. Anim. sans Vert.*, 2d *edit.*, VIII. 114.

Triodopsis clausa, *Rafinesque.*

DESCRIPTION.

Animal. Dark bluish slate color, head and tentaculæ almost black; superior tentaculæ long and slender; foot narrow, in length more than twice the diameter of the shell, terminating in an acute angle.

Shell depressed; *epidermis* brownish horn color, sometimes with very fine, hair-like projections; *whorls* five, with very minute transverse striæ; *suture* not much impressed; *aperture* three-lobed, very much contracted; *lip* white, narrow, reflected, with a deep groove or indentation behind the reflection, contracting the opening so that the outer edge of the lip does not project beyond the surface of the whorl; on the inner margin of the lip are two acute teeth, with the points directed inwards, one near the base, the other midway between that and the junction of the lip with the body-whorl, with a circular sinus between them, forming one of the lobes of the aperture; *pillar-lip* with a long, arcuated, white tooth; *umbilicus* covered, its place considerably impressed.

Greatest transverse diameter, one-third of an inch; ordinary size, less.

GEOGRAPHICAL DISTRIBTUION. Inhabits the Western States, on the borders of the Ohio and Mississippi rivers; it was noticed by Mr. Say in Missouri, and by others in North Carolina and Arkansas.

REMARKS. This species is not likely to be mistaken for any other. It resembles a variety of HELIX

tridentata, Say, from which it differs in having the umbilicus closed, and the tooth on the pillar-lip longer. Large individuals resemble in general appearance H. *appressa*, Say. The epidermis is sometimes delicately hirsute, and the aperture of a rose color. The lip is occasionally destitute of one or both teeth. The name Helix *inflecta*, by which it is universally known in the United States, and the description, were published in 1821, by Mr. Say, more than a year before it was noticed by other naturalists, and several years before any other description appeared.

Lister's figure, tab. 93. fig. 93, probably represents this shell.

14. HELIX MONODON.

Plate X. fig. 1.

H. testâ convexiusculâ, latè umbilicatâ, corneo-fuscescente, hispidulâ, tenuissimè striatâ; aperturâ semilunatâ; labro albo, margine angusto, reflexo; dente unico, albo, longo, laminato, ad columellam obliquè adnato; regione umbilicali impressâ.

Synonyms and References.

Helix mónodon, *Rackett. Trans. Lin. Soc. Lond.*, XIII. 42. *Pl.* v., *fig.* 2.
Helix Leaii, *C. J. Ward. Manuscript.*

Description.

Animal. Yellowish brown, darker on the head, neck, and tentaculæ. Foot narrow, cylindrical, one and a half times as long as the diameter of the shell, terminating in a point. Superior tentaculæ one fourth of an inch long, eyes black. Some individuals much darker than others.

Shell. Slightly convex; *epidermis* dark russet or chestnut color, with numerous very minute, hairy projections; *whorls* five to six, narrow, diminishing very gradually in width, from the outer whorl to the apex; *aperture* flattened, contracted by a deep groove behind the lip; *lip* white, narrow, a little grooved on its face, reflected, extending on the base to, and slightly contracting, the umbilicus, its outer edge not projecting above the surface of the whorl; *umbilicus* open, deep, not exhibiting all the volutions, partially covered by the extended lip; *base* rounded, very much indented in the region of the umbilicus, with a compressed elongated white tooth at the edge of the aperture.

Greatest transverse diameter, nearly one half of an inch.

Geographical Distribution. Inhabits the New England States, in some parts of which it is very common, and the States north of the Ohio River. It will probably be found in all the Middle and North-western States.

Remarks. This species has usually been confounded with Helix *fratérna*, Say, to which it is nearly allied; but the differences are too striking to allow of their being considered identical. It is largely umbilicated, and the umbilicus is but very slightly encroached upon by the reflected lip, which only extends to its edge. The umbilical region is deeply indented. The size of this shell is usually nearly twice as great as that of H. *fratérna*, though it is sometimes much smaller.

In New Hampshire and Vermont, it is found in the

forests with other species, but more commonly in hill-side pastures, under flat stones, a situation where other species rarely occur. Two individuals are commonly found together. The hairy projections of the epidermis are not distinct on young shells, but are often wanting at every stage of growth. The oblique striæ are so fine as hardly to be visible, and in some cases the shell appears to be glabrous. Very beautiful specimens, about one-fourth of an inch in diameter, with a dark, shining epidermis, occur in Ohio. They are more globular, and as the same number of volutions are contained in half the space, they *appear* to have a larger number of whorls than the northern specimens; but I do not see that they differ, essentially, in any respect. Great disparity of size is not uncommon in this genus. It is this variety which Dr. Ward has named Helix *Leaii*. Variations from the common form are rare. This species might, by reason of its open umbilicus, be placed in the next subdivision of the section; but it is so nearly allied to the succeeding species, that it is thought best not to separate them. Férussac has applied the specific name *mónodon* to Helix *unidentàta*, Draparnaud; but as Rackett's description appeared a year before Férussac's synopsis, the latter could not rightfully appropriate this name, and it should be retained for our species, to which it was first applied.

15. HELIX FRATERNA.

Plate X. fig. 2.

H. testâ convexiusculâ imperforatâ, hispidulâ, luteo-rufescente, tenuissimè striatâ; aperturâ angustâ; labro albo, margine angusto, reflexo; dente unico, compresso, albo, ad columellam adnato.

Synomyms and References.

Helix fratérna, *Say.* *Exped. to St. Peter's River,* II. 257. *Pl.* xv., *fig.* 3.

Helix mónodon, *Wood.* *Index Test. Sup.* *Pl.* vii., *fig.* 15.

Helix convéxa, *Deshayes.* *Encyc. Méth.*, *Vers*, II. 253.

Lamarck. *Anim. sans Vert.*, 2d *edit.*, VIII. 112.

Férussac. *Hist. des Moll.* *Pl.* l., *A. fig.* 2.

Description.

Animal. Brownish, darker on the head, neck, and tentaculæ; foot narrow, cylindrical, nearly twice as long as the diameter of the shell, terminating acutely. Eyes black. Some individuals are of a uniform blackish color.

Shell. Slightly convex; *epidermis* light brown; *whorls* about five, narrow; *aperture* contracted by a deep groove behind the lip; *lip* white, narrow, reflected, extending to the centre of the base of the shell, its outer edge not projecting beyond the surface of the whorl; *umbilicus* covered; umbilical region not much indented; *pillar-lip* with a narrow, elongated, white tooth.

Greatest transverse diameter, more than one fourth of an inch.

Geographical Distribution. Inhabits Pennsylvania, the western parts of Virginia, and the States north of the Ohio River, where it is common. It is also found on the western sides of the Green Mountains, in Vermont. Further observations will undoubtedly show that it inhabits some of the States south of the Ohio.

Remarks. This bears a strong resemblance to the preceding species; the chief difference in their structure seems to be, that while the whorls of that shell revolve about its axis at such a distance as to leave a considerable umbilical opening, they are in such near approximation, in this species, as to leave but a small perforation, which the narrow reflected lip is sufficiently wide to cover. In other respects, there is hardly an appreciable distinction ; but, as these differences appear to be constant and uniform, there is a propriety in keeping them separate. Mr. Say described this species with Rackett's description of Helix *mónodon* before him, and considered it distinct. In most cabinets at this time, the two species are confounded under the name of Helix *fratérna.*

Occasionally, the umbilicus is not entirely covered. A variety occurs in Illinois, which is only one-sixth of an inch in diameter.

Lister's figure, tab. 93, fig. 94, I have no doubt is intended to represent this shell. Mr. Say's description was published in 1824. Férussac's "*Prodromus*" had already appeared, giving the *name* of Helix *convéxa* to his species No. 101, but there was nothing to

enable the student to identify it, and, when the figure in Plate 50, A. appeared, several years later, Mr. Say's name was established. Besides, Férussac gave the same specific name to another shell. I think that Mr. Say's name ought to prevail.

16. HELIX HIRSUTA.

Plate X. fig. 3.

H. testâ globulosâ, imperforatâ, castaneâ, hirsutâ ; aperturâ angustissimâ ; labro reflexo, margine interno fissurâ diviso ; dente laminato, elongato, ad columellam affixo.

Synonyms and References.

Helix hirsùta, *Say. Journ. A. N. S. Philad.*, I. 17 ; II. 161.

Férussac. Hist. des Moll. Pl. L., *A. figs.* 1 *and* 3.

Deshayes. Encyc. Méth., Vers, II. 253.

Lamarck. Anim. sans Vert., 2d edit., VIII. 113.

Helix fratérna, *Wood. Index Test. Sup. Pl.* VIII., *fig.* 16.

Stenotrema convéxa, *Rafinesque.*

Description.

Animal. Whitish, head and tentaculæ slate color; foot slender, semi-transparent, length less than twice the diameter of the shell, terminating acutely. Cavity of the tentaculæ apparent, when they are drawn in, by two dark lines with a white space between.

Shell. Sub-globose ; *epidermis* brownish, covered

with numerous sharp, rigid hairs; *whorls* five, rounded; *suture* distinct; *aperture* very narrow, almost closed by an elongated, lamelliform tooth, situated on the pillar-lip, and extending from the centre of the base nearly to the junction of the lip with the outer whorl; *lip* narrow, very much depressed, and reflected against the outer whorl, with a deep cleft or fissure near the centre of the inner margin; umbilicus wholly covered; *base* convex.

Greatest transverse diameter nearly one half of an inch; ordinary size less than one fourth.

Geographical Distribution. Inhabits the Middle and Western States, where it is common, and the New England States more rarely. In Massachusetts it is an uncommon shell.

Remarks. This is a very peculiar species. The singular fissure on the inner edge of the lip distinguishes it from every other. It is almost globular. There is sometimes a minute, tooth-like process on the upper and inner part of the lip, which is visible only on looking into the aperture; and I have once or twice noticed a white band on the body-whorl. It is sometimes covered with a hairy vesture on every part, at other times it is quite smooth. The reflection of the lip is sometimes so closely appressed to the outer whorl as to appear to be absorbed into it.

Wood has figured this and the preceding species in the supplement to his *Index Testaceologicus*, but has caused great confusion by mistaking Helix *fratérna*, Say, for Helix *mónodon*, Rackett, and the present species for Helix *fratérna*, Say, which it resembles only in size. Another shell was described

under this name by the Abbé Brumati in his "Catalogo Sistematico," published in 1836; but it cannot displace Mr. Say's species, which has been known by his name thirteen years.

17. HELIX SPINOSA.

Plate XI. fig. 2.

H. testâ lenticulari, carinatâ, tenui, imperforatâ; epidermide castaneâ hirsutiusculâ; spirâ planulatâ, subtus convexâ; aperturâ angustissimâ; columellâ dente unico, longo, laminato armatâ; labro incrassato, ad marginem superiorem angulato et subreflexo.

Synonyms and References.

Carocolla spinòsa, *Lea.* *Trans. Am. Phil. Soc., N. S.*, IV. 104. *Pl.* xv., fig. 35, *a*, *b*, *c*.

Description.

Animal. Not yet observed.

Shell. Lenticular, with the upper surface much flattened, strongly carinated; *epidermis* dark chestnut color, with minute, projecting, hair-like processes; *whorls* six, of nearly uniform width, and decreasing very gradually from the aperture to the spire; *suture* distinct, not impressed; *aperture* very narrow; *lip* yellowish-white, thickened near its junction with the body-whorl, angulated and slightly reflected; *pillar-lip*, with a long, yellowish, narrow, projecting tooth, extending from the umbilical axis to the angle of the outer lip, and parallel with its thickened edge; *base* convex, with the umbilical region slightly indented.

Greatest transverse diameter rather more than half an inch.

Geographical Distribution. Noticed hitherto only in the upper parts of Alabama and Tennessee, but will probably be found in all the Southwestern States.

Remarks. This is a beautiful and singular species. Its form is very much flattened above, and it is acutely carinated. The epidermis, in good specimens, is chestnut-colored, and covered with minute hairs; these are partially noticeable on the edge of the carina, and suggested to Mr. Lea the specific name *spinòsa*. The base is somewhat convex, and is remarkable for the long, narrow tooth, which, rising from an indentation of the umbilical axis, and running parallel with, and closely approximating to the lip, terminates near where the latter joins the body-whorl. The aperture is merely a narrow space left between this tooth and the lip, and is so small that it appears hardly possible that the animal should be able to pass through it. In some specimens there is an indentation in the lip about midway of its length, resembling slightly the cleft in the lip of Helix *hirsùta*, Say. I am not able to ascertain whether this be accidental or not. It does not appear in Mr. Lea's figure.

The aspect of the base of this shell somewhat resembles that of Helix *hirsùta*, Say, but its superior size and carinated edges at once prevent its being considered the same. It is indeed among the most distinctly marked of our species, and cannot be mistaken for any other.

B. *umbilicus open.*

*** Aperture without teeth.

18. HELIX NUTTALLIANA.

Plate XII.

H. testâ sub-conicâ, subtus convexâ, umbilicatâ, tenuiter striatâ; colore supernè luteâ aut fuscâ, subtus castaneâ; anfractibus septem, fasciâ nigrâ aut castaneâ cinctis; aperturâ sub-rotundatâ, depressâ, intus fasciatâ; labro sub-reflexo; columellâ lævi.

SYNONYMS AND REFERENCES.

Helix Nuttalliàna, *Lea. Trans. Am. Phil. Soc.*, VI. 88. *Pl.* XXIII., *fig.* 74.

DESCRIPTION.

Animal. Not hitherto noticed.

Shell. Sub-conical; *epidermis* light yellow or brownish on the upper surface, with a black or chestnut-colored band revolving from the spire to the outer lip, the lower surface dark chestnut; *suture* distinct, impressed; *whorls* seven, rounded, spirally striate, with minute, delicate lines, the striæ of increase very distinct; *lip* reflected below, simple above; *aperture* ovate; *umbilicus* open, a little contracted by the reflection of the lip; *base* flattened, convex.

Greatest transverse diameter nearly one and a half inches.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Oregon Territory from Fort Vancouver to the ocean,

where it was discovered by Mr. Nuttall during his late expedition.

REMARKS. This beautiful species is unlike any other North American Helix, being much more brilliant in its coloring, and striking in its markings, than is common to them. The upper surface, in those specimens which have come under my observation, is either light yellow, strongly contrasted with a single dark band, revolving on the middle of the body-whorl and on the lower edge of the other whorls, or a light chestnut with a black band. The lower surface or band is of a uniform dark chestnut color. On some individuals there is a faint tracing of intermediate bands, and it is probable that when the shell becomes more common, it may be found that there is considerable diversity of coloring and marking. The lip varies from ashy-white to rufous. The revolving band is generally obsolete on the four whorls nearest the apex. The spire rises in a sub-conical form to the apex, each whorl gradually and regularly diminishing from the body-whorl upwards. The whorls are convex, the striæ of growth regular and fine, and very delicate. Crowded impressed lines revolve upon the whorls. The lip is distinctly reflected at the base of the shell, but the reflection diminishes towards its upper part, and becomes entirely obsolete before it joins the body-whorl. The umbilicus is of inconsiderable diameter but deep, and is somewhat encroached upon by the reflection of the lip.

The name is a compliment to its discoverer.

19. HELIX TOWNSENDIANA.

Plate XIII.

H. testâ orbiculato-convexâ, cornea-luteâ, rugosâ, umbilicatâ; apertura sub-rotundatâ; labro albo, reflexo; columellâ lævi.

SYNONYMS AND REFERENCES.

Helix Townsendiàna, *Lea. Trans. Am. Phil. Soc., N. S.,* VI. 9. *Pl.* XXIII., *fig.* 80.

DESCRIPTION.

Animal. Not yet observed.

Shell. Obtusely convex; *epidermis* yellowish horn-color, rough and corrugate on the body-whorl; *suture* distinct; *whorls* five and a half, with minute longitudinal striæ, which can scarcely be traced by the eye, and coarse oblique ones; *body-whorl* large and voluminous; *aperture* somewhat rounded; *lip* white, fully reflected at the base, and but partially so towards its superior part; *umbilicus* open, deep, a little contracted by the reflection of the lip; *base* convex and turgid.

Greatest transverse diameter one inch and three eighths.

GEOGRAPHICAL DISTRIBUTION. Inhabits the neighbourhood of the Wahlamat, near its junction with Columbia River, whence it was brought by Mr. Nuttall.

REMARKS. The upper surface of this shell resembles, in general aspect, large and coarse specimens of HELIX *albólabris,* SAY. The number and arrange-

ment of the whorls is the same, and the size corresponds; but the epidermis is much more yellow, and the delicate and beautiful oblique striæ of that species are replaced by rough corrugations. The body-whorl is also decidedly larger and more voluminous. On the lower surface, the resemblance disappears; the umbilicus being open and deep, the lip much less reflected and not flattened, and the aperture more rounded. The greater capacity of the body-whorl is also more apparent on the base.

It is named after Dr. Townsend, who accompanied Mr. Nuttall in his expedition to Oregon.

20. HELIX CONCAVA.

Plate XIV.

H. testâ planulatâ, latè umbilicatâ, albido-corneâ; anfractibus quinis ad basim rotundatis; aperturâ sub-rotundatâ, supernè depressâ; labro subtus reflexo, supra simplici; columellâ brevi, callosâ.

Synonyms and References.

Helix cóncava, *Say. Journ. A. N. S. Philad.*, II. 159.

Helix planorbóides, *Férussac. Prodr.*, *No.* 211. *Pl.* LXXXII., *fig.* 4.

Helix Vancouverénsis, *Lea. Trans. Am. Phil. Soc.*, VI. 87. *Pl.* XXIII., *fig.* 72.

Mesomphix planorbóides, *Rafinesque.*

Description.

Animal. Upper surface greyish, tentaculæ bluish, base dirty-white, collar reddish-orange, posterior ex-

tremity slightly tinged with the same. Tentaculæ slender, cavities into which they are retracted visible, foot narrow, twice as long as the diameter of the shell.

Shell. Depressed, very slightly convex on the upper surface; *epidermis* whitish horn-color, sometimes with a tinge of green, at other times with rusty-yellow; *whorls* five, above flattened, below rounded, finely striate obliquely, the outer whorl spreading a little towards the aperture; *umbilicus* wide, deep, exhibiting all the volutions to the apex; *aperture* rounded, somewhat flattened above, its edge frequently tinged with reddish brown; *lip* sub-reflected at the base of the shell, simple above, and in some specimens considerably depressed near its junction with the outer whorl; *columella* with a thin callus, the edge of which connects the upper and lower extremes of the lip.

Greatest transverse diameter one inch and one eighth. Common size half an inch.

Geographical Distribution. This species has been noticed in Vermont, Virginia, Georgia, Ohio, Illinois, Missouri, and the Northwestern Territory, and has been brought lately from the shores of Columbia River, where it is said to be common. It may therefore be considered to inhabit the whole territory of the United States.

Remarks. This shell, though frequently seen, does not seem to be so numerous in our forests as some other species. It is peculiar for the elegant rounded shape of the whorls, as seen on their lower surface. It rarely varies from the common type, and

cannot be mistaken for any other species. The animal is voracious in its appetite, almost always preying upon other species with which it may be kept, and so certainly destroying them, that I have been obliged to keep them by themselves. This they effect by inserting their narrow bodies, which they have the power of elongating and protruding very far from their own shells, into the shells of their victims, and then feeding upon them at their leisure. It burrows in the soil under decaying logs.

The first published description of this shell was by Mr. Say, in 1821, under the name of HELIX *cóncava.* Férussac noticed it (without description) in 1822, in his "*Prodromus, No.* 211," as HELIX *planorbóides*, and afterwards gave a figure of it under the same name. Mr. Say's name has therefore the right of priority, and is universally adopted in this country. Férussac quotes Rafinesque for the specific name in this case, as well as in some others; but it is not known when or where his descriptions were published. In 1839, a second description, with a figure, under the name of HELIX *Vancouverénsis*, was published by Mr. Lea, from large individuals brought from Oregon Territory, on the supposition that they belonged to a new species. After careful examination, I am not able to perceive any difference between the two except that of size. The specific character on which Mr. Lea relies, viz. the "remarkable" depression of the upper part of the lip, and the callus uniting the upper and lower terminations of the lip, are common in specimens of HELIX *cóncava* from various parts of the United

States. Of five individuals which I now have before me, taken without selection from a greater number, three have the depression of the upper part of the lip, and all have the callus. I therefore consider Mr. Lea's species to be identical with Helix *cóncava* of Say.

21. HELIX PULCHELLA.

Plate IX. fig. 2.

H. testâ minutâ, orbiculato-depressâ, umbilicatâ, albâ ; anfractibus quatuor ; aperturâ circulari ; labro crasso, albo, margine reflexo.

Synonyms and References.

Helix pulchélla, *Müller. Verm. Hist., No.* 232, *p.* 30.
Draparnaud. Hist. &c., p. 112. *Pl.* vii., *figs.* 30, 34.
Lamarck. Anim. sans Vert., 2d edit., VIII. 76.
Férussac. Hist. des Moll., No. 173.
Helix paludòsa, *Montagu. Test. Brit., No.* 48, *p.* 440.
Helix minùta, *Say. Journ. A. N. S. Philad.,* I. 123.

Description.

Animal. Whitish, semi-transparent.

Shell. Depressed, slightly convex above, thin, and transparent ; *epidermis* colorless ; *whorls* four, very minutely striated, the last spreading at the mouth like a trumpet ; *aperture* orbicular, a little dilated ; *lip* much thickened, white, reflected, mak-

ing nearly a continuous circle ; *umbilicus* large, exhibiting all the volutions.

Extreme transverse diameter one tenth of an inch.

Geographical Distribution. Inhabits Vermont and Massachusetts, is rather common in the neighbourhood of Boston. It has also been noticed in Ohio, and on the banks of the Missouri River as high as Council Bluffs.

Remarks. This shell, described by Mr. Say as Helix *minùta*, is undoubtedly identical with Helix *pulchélla*, Müller ; for, although it is never supplied with raised striæ or parallel ribs on the outer whorl, as is sometimes the case with that species, yet it agrees with it precisely in all other particulars ; and it is to be observed, that this character is by no means constant in the foreign shell. Though very minute, it is a beautiful species, and its form, which is seen to most advantage by the aid of a magnifying glass, resembles very much that of Cyclostoma *vólvulus*. It is commonly found under stones. It is thought by some to have been introduced from Europe, but I am of opinion that it is a native species. It does not seem possible, that so small an animal, if naturalized near the sea-shore since the arrival of Europeans, should have been able to penetrate to the remote points in the interior of the continent where it is now found.

**** Aperture toothed.

22. HELIX PROFUNDA.

Plate XV.

H. testâ orbiculato-depressâ, latè umbilicatâ, luteo-corneâ, lineis fuscis cinctâ; anfractibus tenuiter striatis, striis confertis obliquis; aperturâ orbiculari; labro albo, ad basim sub-unidentato; margine reflexo.

Synonyms and References.

Helix profunda, *Say. Journ. A. N. S. Philad.*, II. 160.

Say. American Conchology, No. 4. *Pl.* xxxvii., *fig.* 3.

Helix Richardi, *Lamarck. Anim. sans Vert.*, 2d *edit.*, VIII. 40.

Férussac. Hist. des Moll. Pl. vii., 3 *lower figures.*

Deshayes. Encyc. Méth., Vers, II. 212.

Description.

Animal. Light brown, darker on the head, neck, and tentaculæ, and pale on the posterior extremity; foot rather thick, in length less than twice the diameter of the shell, terminating acutely.

Shell. Depressed, slightly convex; *epidermis* yellowish horn-color, with reddish-brown revolving lines and bands; *whorls* from five to six, obliquely striated with delicate raised striæ; *suture* distinct; *aperture* almost circular, a little contracted by the lip; *lip* white, reflected, and flattened, with a slightly

prominent callus or obtuse tooth on the inner edge near the base; *umbilicus* rather large and profound, exhibiting all the volutions to the apex; *base* convex, with the striæ converging into the umbilicus.

Greatest transverse diameter one inch and one eighth.

Geographical Distribution. Inhabits the banks of the Ohio, Mississippi, and Missouri rivers; has been observed on the latter as high as Council Bluffs. Found also in the western parts of Pennsylvania and Virginia.

Remarks. This is one of our most remarkable shells, by reason of its reddish-brown bands and lines. There is usually one band on the upper side of each whorl, wholly visible on the body-whorl and partially concealed on the spire; while on the lower part of the shell there are numerous fuscous lines. In some instances, the broad band is deficient; in others the lines, and occasionally the rufous coloring extends over the whole shell, leaving only one or two lighter lines. The superior and inferior extremities of the lip approach each other at their junction with the body-whorl, leaving only a small space of the whorl between them, and rendering the aperture almost circular; a thin whitish callus sometimes completes the union. The tooth is wanting in immature shells.

Mr. Say's "description of this shell was published in the year 1821. Lamarck's description of Helix *Richárdi* did not appear until April, 1822, but he quotes by anticipation *Férussac, Hist. Nat. des Moll., No.* 174, for the specific name, which, however, was

not then published in that work, but appeared in the *Tableau Systématique* of that author, in the earlier part of the same year. The name of *profúnda* has therefore the priority, and consequently must be adopted." *

23. HELIX SAYII.

Plate XVI.

H. testâ orbiculato-depressâ, tenui, luteo-corneâ, profundè umbilicatâ; anfractibus tenuiter striatis, striis confertis, obliquis; aperturâ rotundatâ; labro albo, margine angustè reflexo, ad basim unidentato; columellâ unico dente albo, exiguo, armatâ.

Synonyms and References.

Helix diodónta, *Say. Exped. St. Peter's River,* II. 257. *Pl.* xv., *fig.* 4.
Helix Sàyii, *Nobis.*

Description.

Animal. Light reddish-brown, tentaculæ smoky, eyes black; head and neck cylindrical, foot narrow, terminating in an acute point; length about twice the diameter of the shell.

Shell. Depressed, a little convex, thin; *epidermis* light russet, shining; *whorls* between five and six, with numerous fine, oblique striæ; *aperture* rounded, not dilated; *lip* white, narrow, reflected, with a slightly projecting tooth on the inner edge near the umbilicus; *columella* with a sub-prominent white tooth; *umbilicus* open, deep, not wide, exhibiting

* Say, in "American Conchology," No. IV.

all the volutions, slightly contracted by the reflected lip; *base* rounded, with the striæ distinct, converging into the umbilicus.

Transverse diameter commonly less than one inch, but there are specimens in the Philadelphia Museum, from Mr. Hyde's collection, measuring one inch and three quarters.

Geographical Distribution. Inhabits all the northern parts of the United States, from Illinois to Maine. Is rather common on the slopes of the Green Mountains in Vermont.

Remarks. This is a handsome species, with a delicate, shining epidermis. It is not likely to be taken for any other species except Helix *profúnda*, Say, from which it is distinguished by its inferior size and solidity, its narrow lip, and less circular aperture, the absence of the brown lines and bands, and the presence of the tooth on the pillar lip. It varies in the greater or less depression of the spire, and is sometimes destitute of the tooth on the pillar lip.

On the third day of July, 1836, I discovered an individual of this species in the act of laying its eggs in a damp place under a log. I transferred them, with the animal, to a tin box filled with wet moss. The eggs were not much more than half as large as those of Helix *albólabris*, Say; they were white, adhering together very slightly, flaccid, and apparently not entirely filled with fluid. During the succeeding night the number had increased to about fifty, and in a few hours they became full and distended. As the snail now began to devour the eggs,

I was obliged to remove it. On the 29th of July all the eggs were hatched; the young snails had one whorl and a half, the umbilicus was open, the head and tentaculæ were bluish-black, and the other parts whitish and semi-transparent. They immediately began to feed, and made their first repast of the pellicle of the eggs from which they had just emerged. They grew rapidly, and before the middle of October, when they went into winter quarters, they had increased their bulk four or five times beyond its original measurement.

Mr. Say published his description of this species, under the name of HELIX *diodónta,* in 1824, but that specific name seems to have been preoccupied for a very different shell, (See *Lamarck, Anim. sans Vert.*, 2*d edit.*, VIII. 116,) and is now recognised by several authors as applied to a species established by *Megerle.* It is necessary, therefore, to adopt a new name. I propose that of SAYII, in honor of THOMAS SAY, the describer of the greater part of our land shells. I am aware that the use of proper names for this purpose has been so much abused, that such an application might no longer be considered a compliment by a living naturalist; but Mr. Say's reputation is too well established to suffer by his name being mingled with the great crowd of known and unknown persons, to whom a similar honor has been offered.

24. HELIX TRIDENTATA.

Plates XVII and XVIII.

H. testâ depressâ, profundè umbilicatâ, corneo-rufescente; anfractibus striatis, striis distinctis, crebris, obliquis; aperturâ contractâ, trilobatâ; labro albo, reflexo, dentibus duobus instructo; columellâ dente albo sub-arcuato armatâ.

Synonyms and References.

Helix tridentàta, *Say*. *Nich. Encyc., Am. Ed.*, IV. *Pl.* II., *fig.* 1, *very bad figure.*
Férussac. Hist. des Moll. Pl. LI., *fig.* 3.
Wood. Index Test. Sup. Pl. VII., *fig.* 2.
Deshayes. Encyc. Méth., Vers, II. 213.
Lamarck. Anim. sans Vert., 2d edit., VIII. 115.

Helix fallax, *Say*. *Journ. A. N. S. Philad.*, II. 119.

Description.

Animal. Dark bluish slate-color, deeper on the head, back, and tentaculæ; length of superior tentaculæ about a quarter of an inch; foot narrow, equal in length to nearly twice the diameter of the shell, terminating in an acute angle.

Shell. Depressed, a little convex; *epidermis* russet-brown; *whorls* four and a half to six, crossed obliquely by numerous acute, raised lines; *aperture* trilobate, more or less contracted by a groove behind the lip; *lip* white, reflected, its outer contour rounded, furnished on its inner margin with two acute projecting teeth; *pillar-lip* with a white, projecting, slightly

curved tooth, placed obliquely in the aperture; *umbilicus* open, deep; *base* rounded, striæ converging into the umbilicus.

Greatest transverse diameter three fourths of an inch; common size less than half an inch.

Geographical Distribution. Inhabits all the States. Common in forests in the interior, less frequent near the sea-coast.

Remarks. This common and well-marked shell varies considerably in size. In the fertile sections of the Western States it attains its largest diameter; in Vermont it usually measures about half an inch, and on the sandy soil of Florida only a fourth of an inch in diameter. It varies also in the characters of the lip and aperture. In specimens from the North-eastern States the lip is usually narrow, but slightly contracting the aperture, the teeth are but little prominent, and the spire is flattened, comprising less than five whorls. In those from the Western States the lip is wider, the aperture more contracted, the spire more prominent, and the whorls comprise more than five volutions. But the most remarkable variety is that which Say considered distinct enough to form a separate species, under the name of Helix *fallax*. In this, the spire is more elevated, and sometimes has six full volutions. There is a deep groove behind the lip contracting the aperture; the lip is widely reflected and directed inwards, forming a basin-shaped mouth; the upper labial tooth is broader, sometimes bifid and even trifid, and very much inflected; the columellar tooth extends quite to the base of the shell, and unites with the extremity of the lip; the

aperture is nearly filled up by the teeth and the contraction of the lip. If this variety were to be seen alone it would be adjudged to be a good species, and is generally so considered. Having examined a great number of every variety from numerous localities, I am convinced that they form but one species. The animals do not differ in the least degree.

Helix *tridentàta* resembles Helix *palliàta* on its upper surface, as has been mentioned in the remarks on that species, but differs from all others. The situation in which I have most commonly found it is under the layers of wet and decaying leaves in forests; it is also found under flat stones. I have one specimen in which the direction of the whorls is reversed.

The figure of Férussac referred to represents a very small shell, probably the southern variety. Lister's figure, tab. 92, fig. 92, is probably intended for this shell. Plate XVII. of this work represents the variety found in the Western States; plate XVIII., fig. 1, that from the Northeastern States; fig. 2, the small variety from Florida; fig. 3, the variety *fallax* of Say.

25. HELIX AURICULÀTA.

Plate XIX. figs. 1, 2.

H. testâ depressâ, subtus convexâ, corneo-rufescente; anfractibus striatis, striis distinctis, crebris, elevatis; aperturâ auriculatâ, angustissimâ, contortuplicatâ, ringente, marginibus connexis; columellâ plicâ reflexâ in aperturam intrante; labro supra prominente, subtus ad basim appresso, internè bi-plicato; umbilico aperto.

Synonyms and References.

Polygyra auriculàta, *Say.* *Nich. Encyc., Am. ed.*, Vol. IV. *Journ. A. N. S. Philad.*, I. 277.

Polygyra avàra, *Say.* *Nich. Encyc., Am. edit.*, IV. *Journ. A. N. S. Philad.*, I. 277.

Helix avàra, *Férussac.* *Hist. des Moll.* *Pl.* L., *fig.* 2.

Helix auriculàta, *Férussac.* *Hist. des Moll.* *Pl.* L., *figs.* 3, 4.

Lamarck. *Anim. sans Vert., 2d edit.*, VIII. 112.

Helix Sayii, *Wood.* *Index Test. Sup.* *Pl.* VII. *fig.* 34. ?

Description.

Animal. Longer than the breadth of the shell, acute behind, above granulated and blackish, beneath and each side white.*

Shell. Depressed, very slightly convex above, below convex; *epidermis* brownish horn-color; *whorls* more than five, a little rounded, crossed by numerous distinct, equidistant, oblique striæ, the *upper part* of the last whorl near the mouth is suddenly reflected from the preceding whorl and turned outwards, having a sharp carina on its inner edge, the *lower part* is slightly reflected, but attached; *lip* projecting in the upper part, somewhat reflected in the middle, and appressed to the whorl and in-

* Say, in Nicholson's Encyclopædia, American edition, Vol. IV.

dented below; *pillar-lip* emarginate, strongly reflected and pressed upwards into the aperture in an acute angle; *aperture* ear-shaped, throat very narrow, with a lamellar fold or tooth within above, and another more external below, with a deep sulcus between them; *umbilicus* open, carinated and grooved on the last whorl, exhibiting nearly two volutions.

Greatest transverse diameter more than half an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Georgia and Florida, common near St. Augustine and at various places on St. John's River.

REMARKS. This is one of several curious species, which were discovered by Mr. Say in Florida, and of which he formed the genus POLYGYRA, so called from the numerous whorls of some of them. The animal does not appear to differ from that of HELIX; and, as mere peculiarities in the shell are not recognised as sufficient for the subdivision of genera, his distinction has not obtained. Mr. Say gives a separate measurement of males and females, from which it would seem that he considered the animals to be unisexual, a distinction which, if correct, would effectually separate it from HELIX, the animal of which, in every case, combines both sexes in the same individual. I have had occasion to notice considerable numbers of the animal of POLYGYRA *septemvólva*, SAY, but have not observed any fact which would tend to confirm such an opinion. On the contrary, it has appeared to me, that they were analogous in all respects to the animals of the genus HELIX.

This shell is peculiar for the complicated form of its aperture, which bears a considerable resemblance to the human ear. In mature individuals the lip is very much projected, the folds within the aperture are prominent, and the aperture greatly contracted. The laminated folds within are marked by corresponding depressions externally, behind the reflection of the lip. At different periods of growth the aperture differs very much in appearance, and has led naturalists into error. When the lip is just beginning to be formed, and as yet projects but little, there are two projecting teeth on its inner edge with a deep sulcus between them; as these continue to grow, they assume more and more the appearance of lamellar folds, the lower one of which, when viewed on a line perpendicular to the base of the shell, hides the other. The columellar fold, at the same early period, appears more like an independent tooth, to each extremity of which the lip is connected. It is this variety which Mr. Say described as a distinct species, under the name of POLYGYRA *avàra.* This opinion I derive not so much from his descriptions as from the examination of original specimens, collected and labelled by him, now in my possession. I also consider HELIX *Texasiàna*, MORICAND, (*Mém. de la Soc. de Physique et d'Hist. Nat. de Genève*, VI. 538. *Pl.* I., *fig.* 2,) to represent this shell. The specific description of this author would apply to several of our tridentate species, but the engraved figure represents very exactly a variety of this species with an immature aperture. M. Férussac referred H. *Texasiàna* to

the next species.* Plate XIX., fig. 1, represents the mature shell; fig. 2, the young shell described by Say, as P. *avàra.*

26. HELIX FATIGIATA.

Plate XIX. fig. 3.

H. testâ sub-planulatâ, umbilicatâ, luteo-corneâ; anfractibus striatis, striis distinctis, crebris, elevatis; aperturâ sub-orbiculari, contracta; labro albo, reflexo, intus bidentato; columellâ plicâ sub-acutâ in medio aperturæ projectâ.

Synonyms and References.

Polygyra plicàta, *Say. Journ. A. N. S. Philad.*, II. 161. *Nich. Encyc., Am. edit.*, Vol. IV.
Polygyra fatigiàta, *Say. Disseminator of Useful Knowledge*, 1829.
Polygyra Dorfeuillàna, *Lea. Trans. Am. Phil. Soc.*, VI. 107. *Pl.* xxiv., *fig.* 118.
Polygyra Troostiàna, *Lea. Ibidem*, VI. 107. *Pl.* xxiv., *fig.* 119.

Description.

Animal. Not hitherto noticed.

Shell. Plane above or a little convex; *epidermis* light russet; *whorls* more than five, with numerous raised, oblique, equidistant striæ; *aperture* shaped like a horseshoe; *lip* equally reflected, regularly arcuated, describing two thirds of a circle, with a depression behind its reflection; within the aperture,

* Bulletin Zoologique, 2d Sect., p. 85.

on the outer side of the whorl, are two prominent white teeth, the lower near the base conical, the upper more compressed and placed farther within; *columella* with an oblique tooth or fold projecting toward the centre of the aperture, and connected by slightly-raised curved lines of callus with the superior and inferior extremities of the lip; *base* of the shell showing about one and a half volutions of the spire.

Greatest transverse diameter more than one third of an inch.

Geographical Distribution. Found hitherto in Illinois, Ohio, Alabama, Kentucky, and Tennessee. Though not common, it seems to be a widely-spread species.

Remarks. This peculiar and interesting shell has been hitherto rare in collections, and is therefore but little known. Some specimens are entirely flat on the upper surface, in some the striæ of the whorls are distinct on the upper and lower surfaces, in others only on the upper, leaving the lower surface smooth. The outer whorl is occasionally carinated. The aperture is usually shaped like a horseshoe. The teeth within the aperture might escape notice if not looked for. The columellar tooth varies considerably, being in some thin and oblique, connected by delicate lines of callus at either extremity with the lip, in others larger and more prominent, with the space between the two lines of callus more or less filled up with testaceous matter. This species was first described by Mr. Say, as Polygyra *plicàta.* A variety differing in some slight particulars, but found

at a point very remote from the first, was described by him as Polygyra *fatigiàta.* Recently, Mr. Lea has enlarged its synonomy by the addition of two new specific names. The distinctions on which the latter has founded his species, in this instance, are not, I think, sufficient for that purpose; if admitted to be valid, they would lead to an infinite multiplication of species, and burthen the descriptive part of Natural History with a mass of matter beyond the compass of any mind.

Having in my possession original specimens of Polygyra *plicàta* labelled by Mr. Say, and having through the politeness of Mr. Lea had the opportunity of examining the specimens from which he made his descriptions of Polygyra *Dorfeuillàna* and *Troostiàna*, the opinion which I derived from his descriptions and figures has been confirmed, and I cannot doubt the specific identity of the three. There is, however, much difficulty in identifying specimens of Mr. Say's Polygyræ; they vary much in size at maturity, and the younger shells differ from the older in a remarkable manner in the character of the aperture. There is a small shell figured by Férussac, *Hist. Nat. des Moll., pl.* l., *fig.* 1, as Polygyra *pústula*, Say. Its general characters agree with the species under consideration, but the aperture is kidney-shaped, the lip reflected, thickened internally, and divided by a deep cleft or sinus. It is distinctly umbilicated, and the lip extends to the edge of the umbilicus. The duplicature of the columella terminates in an acute angle, and is connected with either termination of the lip. The only recent

specimen which I have seen is an imperfect one in the cabinet of Mr. Lea. It is impossible to decide from a single specimen, whether it be the young of the present species, which is probable, or is entitled to be considered a distinct species. The original specific name *plicàta* being preoccupied in this genus, I have adopted Mr. Say's second name, *fatigiàta*.

27. HELIX SEPTEMVOLVA.

Plate XIX. fig. 4.

H. testâ orbiculari, planulatâ, umbilicatâ, corneâ; anfractibus numerosis, obliquè et acutè striatis; aperturâ ab axe remotâ, sub-orbiculari, marginibus connexis; columellâ unilamellatâ; labro albido, margine reflexo.

Synonyms and References.

Polygyra septemvólva, *Say. Journ. A. N. S. Phil.*, I. 278. *Nich. Encyc., Am. edit.*, Vol. IV.

Helix septemvólva, *Férussac. Hist. Nat. des Moll. Pl.* LI., *fig.* 6.

Wood. Index Test. Sup. Pl. VII., *fig.* 14.

Deshayes. Encyc. Méth., Vers, II. 208.

Helix planórbula, *Lamarck. Anim. sans Vert., 2d edit.*, II. 67.

Description.

Animal. Brownish, tentaculæ darker, eyes black; foot narrow, thin, semi-transparent, receiving its color in some degree from the substance on which it is placed; length less than twice the breadth of the shell.

Shell. Discoidal, sub-carinated; *epidermis* corneous; *whorls* from less than six to more than eight, narrow, compressed, diminishing very gradually in width from the aperture to the apex, with raised, acute, tranverse lines, which are nearly obsolete on the base; *lips* continuous round the aperture; *outer lip* reflected, with a groove behind the reflection, regularly rounded so as to describe two thirds of a circle; *pillar-lip* with an acute fold, or tooth, projecting towards the aperture; *base* showing from two to four volutions in the same plane, with a moderate umbilicus, extending to the apex.

Greatest transverse diameter nearly five eighths of an inch, commonly much less.

Geographical Distribution. Inhabits Georgia, Florida, and Alabama. Very common on the sea islands. I noticed immense numbers of them on a small island in St. Joseph's Bay, Florida, under the decaying leaves of the palm tree, in company with a species of Helicina.

Remarks. The compressed, discoidal shape of this shell, and its numerous narrow whorls revolving round their axis in the same plane, seem to distinguish it from other species. It varies in being occasionally a little convex, more or less carinate, and in exhibiting a greater or less number of full volutions on the base. I have seen specimens of this shell, which were said to be brought from one of the West India islands. It is very probable that this, as well as other species, is common both to the peninsula of Florida and the nearest islands of the Gulf of Mexico.

23. HELIX LABYRINTHICA.

Plate XXVI. fig. 1.

H. testâ minutissimâ, sub-conicâ, apice obtuso, corneo-lutescente; anfractibus striatis, striis distinctis, obliquis; labro incrassato, subreflexo; umbilico minimo, impresso; columellâ dente laminato in aperturam intrante.

Synonyms and References.

Helix labyrinthica, *Say. Journ. A. N. S. Philad.*, I. 124. *Nich. Encyc., Am. edit.*, IV. *Férussac. Hist. des Moll. Pl.* LI., *B. fig.* 1.

Description.

Animal. Not hitherto observed.

Shell. Very minute, conic, apex obtuse; *epidermis* brownish horn-color; *whorls* six, with conspicuous, elevated, obtuse, equidistant, oblique lines; *lip* thickened, somewhat reflected; *columella* with a long, lamelliform, raised line or tooth, which appears to revolve within the shell parallel to the suture, and sometimes a second, nearer to the base, less conspicuous, and terminating farther within the aperture; *base* flat; *umbilicus* small, impressed.

Greatest transverse diameter one tenth of an inch.

Geographical Distribution. Inhabits a wide range of territory; was noticed by Mr. Say in Missouri; is found in Vermont, and also in Massachusetts.

Remarks. This species is of about the same size as Helix *rupéstris*, Draparnaud, of Europe. It is very remarkable for the raised parallel laminæ which

revolve within the shell, terminating abruptly on the columella. Usually but one of them is apparent. When both are visible, their parallel and curved lines bear some resemblance to the track of a railroad. The oblique striæ on the whorls are very conspicuous. It varies much in the height of the spire, some specimens being very much flattened, others with a pointed apex; usually the spire is high and rounded at the apex. The aperture is moderate, not dilated, and often delicately roseate. Found in forests in the interstices of decaying logs, and under the layers of wet and decomposing leaves.

(To be continued.)

ART. XII.—DESCRIPTIONS OF TWO NEW SPECIES OF *ANCULOTUS*. By J. G. Anthony. (Read December 18th, 1839.)

Anculòtus carinàtus.

Pl. III. fig. 5. Cabinets of J. G. Anthony, Mrs. Say, and Dr. J. P. Kirtland.

Shell oblong, spire as long as the aperture; volutions four, convex; suture not remarkable; body-whorl angularly ventricose, color olivaceous; from two to five elevated black carinæ, commencing at the upper part of the aperture, traverse the body-whorl; aperture within bluish-white and translucent, the carinæ being very apparent through it. Extreme length, ¾ inch. Extreme breadth, ½ inch.

For this beautiful species of Anculòtus I am indebted to Mrs. Say, who found it at the Falls of the Kanawha a few weeks since, and kindly presented me with specimens of it for description.

The spire in young specimens is nearly pointed, but in the adult is truncated, presenting rarely more than three whorls; in some specimens a black band passes round each whorl near its upper edge. The operculum is striated in oblique curves.

Anculo'tus Kirtlandia'nus.

Pl. III. fig. 4. Cabinets of J. G. Anthony, Mrs. Say, and Dr. J. P. Kirtland.

Shell turreted, with four convex whorls; spire truncated, the truncation generally destroying one of the volutions; the body-whorl slightly ventricose; color dark-olive; aperture sub-ovate; base attenuated, within clouded-purple and banded. Length ¾ inch. Breadth ½ inch.

Another species which I owe to the kindness of Mrs. Say. It is found in the same situations with A. *carinàtus*; it resembles very much a Mela'nia, the spire being quite as much elevated as in most of the species of that genus; the young are very beautifully banded.

ART. XIII.—MONOGRAPH OF THE SPECIES OF *PUPA* FOUND IN THE UNITED STATES; WITH FIGURES. By Augustus A. Gould, M. D. (Read November 3d, 1840.)

Having recently become interested in the examination of the American species of the genus Pupa, I have found very great confusion and uncertainty prevailing in regard to them. The objects them-

selves are minute and difficult to examine; the number of teeth, which is one of the most important specific characters, varies at different stages of maturity; and, what is still more unfortunate, Mr. Say, who gave names to all the species which have been hitherto described, gave us no figures in illustration of his descriptions. These are the sources of confusion, and hence I have received, from our best conchologists, a single species under four of the six names that Mr. Say applied to his different species.

It would be well, if, in writing descriptions, the teeth were arranged as primary and secondary, indicating by the *primary* those teeth which are always present when there are any, and by *secondary* those which are superadded in the progress of growth, or at maturity. Such a division would be applicable in regard to almost every species.

I have collected every specimen of PUPA which I could find in the cabinets of Boston, and have received numbers from Pennsylvania, Maryland, and Ohio, and I have carefully examined every individual. By means of a stationary microscope of moderate power, and by employing a convex lens in such a way as to bring the rays of the sun to a focus within the aperture of the shell, I have been enabled to obtain a fair view of the deeply seated teeth.

I have made out some of Mr. Say's species with certainty, and have become satisfied with regard to others in my possession, that they were unknown to him. Two or three of his species I have not yet seen, or have failed to identify them.

It is hoped that the accompanying figures may

put an end to further doubts as to the species which they represent; and, by the aid of conchological friends, I may hereafter be enabled to present figures of the remaining un-illustrated species. I would especially request of those who have species not here described, that they would favor me with the loan of them, or send me descriptions or figures of them.

PUPA CORTICÀRIA.

Plate III. fig. 19.

P. testâ, albidâ, sub-cylindraceâ, obtusâ; anfractibus quinque; aperturâ sub-orbiculari; labio dente unico prope angulum externum, sub-dentato ad angulum internum; labro revoluto.

" *Odostòmia corticària.* Shell dextral, cylindrical, obtuse at the apex; whorls five, nor perceptibly wrinkled or striate. Aperture sub-orbicular, lip reflected; a single tooth on the pillar lip, near the outer angle; inner angle with an angular projection resembling a second tooth, sometimes obsolete.

" Length about a tenth of an inch.

" Very common under the bark of trees near the earth, and resembles *Turbo muscòrum* of authors." (SAY, *in Nicholson's Encyclop.* (*Amer. ed.*), *article Conchology*, pl. IV., fig. 5.)

The shell, when fresh, is transparent, and of a spermaceti-color; but it is usually found opaque and chalky. All the specimens I have seen were from Ohio. Mr. Earle, however, in his "Catalogue of Massachusetts Land Shells," enumerates this as a native. The shell, which has hitherto borne this name in the Society's Cabinet, is PUPA *contrácta.*

Mr. Say compares it with T. *muscòrum*, of Montagu, not Linnæus, (P. *umbilicàta*, Drap.), to which it does not bear a very strong resemblance. He states it to be very common under the bark of trees; but it certainly is very rare in collections.

PUPA EXÍGUA.

Plate III. fig. 20.

P. testâ minutissimâ, albidâ, oblongo-ovatâ, sub-acuminatâ; anfractibus quinque convexis; labio per-obliquo, prope angulum internum dentato; columellâ sub-dentatâ; labro revoluto.

"Shell dextral, tapering, oblong, with minute grooved lines; apex obtuse; whorls five; suture deeply impressed; labium bidentate, superior tooth situate rather beneath the middle of the lip, inferior tooth small, placed on the columella; labrum mutic, reflected, not flattened; umbilicus distinct.

"Length more than one twentieth of an inch.

"This is the smallest species I have seen. Its aperture resembles that of P. (Cary′chium) *corticària*, but the superior tooth of the labium of that shell is situate much nearer to the superior termination of the labrum than the corresponding tooth of this diminutive species. It is probably a Cary′chium." (Say. *Journ. Acad. Nat. Sc.*, II. 375.)

Mr. Say found it near Philadelphia. Professor Adams has obtained it near Middlebury, Vt., and it has been collected in various regions in Ohio, by Dr. Kirtland, Dr. Ward, and Mr. J. G. Anthony. A few specimens have been found under moist boards in Cambridge.

It is remarkable for its minuteness, its tapering form, and its very oblique, oval aperture. The similarity between it and the *Turbo cary'chium*, of Montagu (*Test. Brit.* 339. *Suppl.* pl. xxii., fig. 2.), which is the *Cary'chium minimum* of Leach and Pfeiffer, is almost perfect.

PUPA CONTRÁCTA.

Plate III. fig. 22.

P. testâ albâ, ventricosâ, obtusâ; anfractibus quinque convexis; aperturâ sub-triangulari, expansâ; labio dente magno excavato; labro revoluto, sinuato; dente altero in faucibus profundo.

"Shell dextral, short, subovate, white; apex obtuse; whorls five; umbilicus distinct; aperture irregularly orbicular, complete, the lamina of the labium being elevated above the surface of the preceding whorl, and joining the extremities of the labia; labium with a large, elongated, prominent tooth, which is concave on the side towards the labrum; labrum bidentate; a large tooth or fold far within the throat, caused by the fold of the umbilicus; throat much contracted by the large tooth of the labrum into the form of a horseshoe.

"Total length less than one tenth of an inch.

"This is a short, wide species, sufficiently distinct from others, and readily distinguished by the lamina of the labrum being much elevated, and by the magnitude of the tooth of the labium. This species probably belongs to the genus Cary'chium." (Say. *Journ. Acad. Nat. Sc.*, II. 374.)

Mr. Say found it in Virginia. It has since proved

to be a wide-spread species, and has been found in all the northern range of States, wherever it has been sought for. When fresh, it seems to be invested with a glutinous pubescence, by which particles of earth become entangled and partially conceal it.

PUPA ARMÍFERA.

Plate III. fig. 10.

P. testâ griseâ, cylindraceâ, obtusâ; anfractibus sex planulatis; aperturâ semiovali, dentibus quinque armatâ, quorum unus emarginatus labio, unus ad columellam affixus.

"Shell dextral, oblong-oval or somewhat obtusely-fusiform; suture distinct; whorls six, obsoletely wrinkled; aperture longitudinally sub-ovate; exterior lip reflected, but not flattened, interrupted above by the penultimate whorl, and with five teeth, of which the superior one and that which precedes the basal one are smallest; labrum with an undulated lamelliform tooth, its anterior extremity little elevated, but elongated, so as almost to join the superior extremity of the exterior lip.

"Length three twentieths of an inch.

"Very distinct from P. *corticària*, in being a much larger and proportionally more dilated shell, and, with that species, seems to belong more properly to the genus Cary'chium of Müller and Férussac." (Say. *Journ. Acad. Nat. Sc.*, II. 162.)

Mr. Say found it in upper Missouri. It is very abundant in Ohio, but I have not heard of any specimens found on this side of the Alleghanies.

He notices, that sometimes one and sometimes the

two smallest teeth are wanting. Indeed I have found only one specimen in which the little basal tooth is present; while there is very frequently an additional tooth on the outer lip, posterior to the others. If we except P. *plácida*, a somewhat doubtful species, it is the largest Pupa of the United States, and is not likely to be confounded with any other.

PUPA PRÓCERA.

Plate III. fig. 12.

P. testâ cylindraceâ, elongatâ, apice obtusâ; anfractibus sex, convexis, obliquè striatis; aperturâ semi-ovali, dentibus sex armatâ, quorum posterior emarginatus.

Shell elongated, ovate-cylindrical, obtuse at apex, of a brownish horn-color; whorls six, convex, the three anterior ones of nearly equal diameter, and the three posterior ones forming a very obtuse apex; suture deep; aperture semi-oval, rather longer than broad; lip brown, somewhat incumbent at the middle of the right side, unequally reflected, not flattened, and curving at an abrupt angle before it joins the preceding whorl; throat armed with five teeth; one on the middle of the transverse lip is compressed, stretching towards the junction of the outer lip, and emarginate at the middle, sometimes even bicuspid; a conical one on the pillar a little below its junction with the transverse lip, and sometimes there is a small denticle at the base of this; a smaller one at the anterior termination of the pillar; a small one, often wanting or inconspicuous without a large magnifier, about the middle of the outer lip; and the

fifth, broad and considerably elevated, seen at the very depth of the cavity of the aperture as we look down into it, opposite to the tooth of the transverse lip; umbilicus small and open.

Length $\frac{1}{10}$ of an inch; breadth $\frac{1}{30}$ of an inch.

This very distinct species was sent to me by Professor E. Foreman, of Baltimore, who seems to have found it plentifully. It comes nearer to P. *rupicola*, than to any of Mr. Say's species.

PUPA MÍLIUM.

Plate III. fig. 23.

P. testâ minutissimâ, ovali, castaneâ; anfractibus quatuor convexis, obliquè striatis; aperturâ cordatâ, dentibus sex, compressis armatâ, quorum duobus labio affixis.

Shell minute, of a globosely-oval form, color a light-chestnut; whorls four or somewhat more, obviously wrinkled obliquely, rather convex; apex bluntly rounded; suture deep; aperture half the width of the last whorl, heart-shaped, the apex being at the right posterior angle; the transverse margin is nearly direct; the outer lip is scolloped by an indentation of the lip; the remainder of the margin is regularly arcuated; lip white, slightly everted; throat with six teeth, two of which are on the transverse lip, equidistant; one, with a tubercle at its base, is on the middle of the columella, and nearly at right angles with the preceding, and is the largest; a fourth is on the indenture of the outer lip, directed between the two on the transverse lip; and two smaller ones, more retired within the shell, are equidistant between

the two last-mentioned; umbilicus large and deep. Length less than $\frac{1}{30}$ of an inch; breadth $\frac{1}{40}$ of an inch.

This is the most minute species I have yet seen; even more so than P. *exigua.* In size and outline it may be compared with P. *vértigo*, Drap., (*Vértigo pusílla* of other authors) of Europe; but that is a reversed shell. The teeth are all distinct, long, compressed, and very sharp. I first discovered it at Oak Island, Chelsea, on a warm, damp day, in November, 1839, crawling upon fallen leaves, in company with *Bulímus lúbricus.* Professor Adams has since found it in Vermont. It, doubtless, has a wide range, but its minuteness renders it difficult to be detected.

PUPA SIMPLEX.

Plate III. fig. 21.

P. testâ minimâ, cylindraceâ, obtusâ, lævi; anfractibus sex, subplanulatis; aperturâ orbiculari, edentulâ.

Shell minute, the two anterior thirds cylindrical, surmounted by a rapidly formed, blunt apex; light chestnut-colored. Whorls five, moderately convex, separated by a well-impressed suture, quite smooth; aperture circular, excepting a slight encroachment by the preceding whorl; lip simple, sharp, slightly everted on the left side, and partially hiding a small umbilicus. No trace of a tooth has been detected. Length $\frac{1}{15}$ of an inch; breadth $\frac{1}{30}$ of an inch.

The only locality where this has been found is a small grove, a little northward of Fresh Pond, in Cambridge. In this place numerous specimens have

been found by myself and others, at every season from May to November. They live among the decaying leaves, in company with HELIX *lineàta, labyrínthica, chérsina,* and *indentàta.* Having been gathered in spring and autumn, we may safely suppose some of them to have been adult; yet none of them exhibit any trace of a tooth. Its circular aperture readily distinguishes it from all our other species. It is nearly identical, however, with P. *edéntula,* DRAP. (*Vértigo nitida,* FÉRUS.)

PUPA BÀDIA.

Pupa bàdia, ADAMS, p. 331, pl. III., fig. 18, is almost precisely like P. *marginàta,* DRAP., BRARD., &c., the P. *muscòrum,* LAM. It belongs to the genus PUPÍLLA, Leach. See Turton's *Manual* (Gray's edit.), 196., pl. VII., fig. 79.

(To be continued.)

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ART. I.—A MONOGRAPH OF THE HELICES INHABITING THE UNITED STATES. By Amos Binney, M. D. (Continued from p. 394.)

Section II.—Lip simple.

C. *umbilicus closed, or nearly so.**

29. HELIX INTERNA.

Plate XXI. fig. 1.

H. testâ convexo-depressâ, imperforatâ, rufâ; anfractibus octo, valde striatis, striis elevatis, crebris, obliquis; aperturâ transversali, angustâ; labro simplici, acuto, intus incrassato et bidentato; dentibus albis, laminatis; basi lævigato; regione umbilicali impressâ.

* The presence or absence of an umbilical opening is much less to be depended on, as a distinctive character for the subdivision of this genus, than I supposed it to be when I adopted it in the introduction to this paper. I find that individuals of the same species differ widely in this respect, the whorls in some revolving in such close juxtaposition as to leave no perceptible opening, while in others it is very considerable. If I were *now* seeking for characters on which to

SYNONYMS AND REFERENCES.

Helix intérna, *Say.* *Journ. A. N. S. Philad.*, II. 155.

Helix Pomum-Adàmi, *Green.* *Cabinet of Natural History.*

DESCRIPTION.

Animal. Not hitherto observed.

Shell. Depressed, slightly convex; *epidermis* reddish-brown, shining; *whorls* eight, with regular, equidistant, elevated, oblique striæ, separated by distinct grooves; *suture* deeply impressed; *aperture* flattened, transverse, narrow; *lip* thin, acute, thickened internally; *within the aperture*, on the outer lip somewhat distant from the margin, are two prominent, lamelliform, white teeth; *base* smooth, polished; *umbilical region* indented.

Greatest transverse diameter one fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits Ohio, Missouri, and the western parts of Pennsylvania and Virginia. It will probably be found in all the Western States.

REMARKS. This is a beautiful as well as a very distinct species. Its uniform shining reddish brown color is peculiar to it. Its numerous narrow whorls increasing almost imperceptibly in width from the

found a subdivision, I should adopt the presence or absence of teeth in the aperture. I include in this section those species in which the umbilicus is wholly or nearly obsolete in its most mature and perfect state, although in a younger stage of growth it may be well marked and constant.

apex outward, with their very prominent elevated striæ of increase, give it a considerable resemblance on the upper surface to the Polygyræ of Say, but on the base the similarity ceases. The aperture including the teeth is very much like that of Helix *gulàris*, Say, but is smaller in proportion to the size of the shell, and the teeth are shorter and less lamellar, while they are equally prominent. The oblique striæ, so distinct on the upper surface, cease entirely at an obtuse carina on the upper part of the outer whorl, leaving the base smooth. The base is rather lighter in color than the upper surface, and is indented in the centre. The umbilicus is nearly or quite obsolete. The edge of the lip is brown. The whole surface sometimes, and the base often, reflects a metallic lustre.

The teeth within the aperture are in general formed of a single lamina or fold, but sometimes one or both of them are bifid or even trifid. In some specimens, I have observed a second pair of teeth, through the base of the shell, at the distance of three fourths of a volution from the aperture, with indistinct marks of a third set yet further removed. These internal teeth (in this and in other species) undoubtedly mark certain periods of increase. The growth seems to go on actively for a time by the addition of new testaceous matter, indicated by the oblique striæ, and then alternates with a season of repose, when the teeth and aperture are formed and used. It is quite likely that these periods are annual. The teeth appear never to be entirely absorbed and removed, although the aperture near which they

were originally placed is often advanced very far beyond them.

30. HELIX GULARIS.

Plate XI. fig. 1.

H. testâ convexâ, sub-elevatâ, nitidâ, imperforatâ, luteo-corneâ; anfractibus septem, minutè striatis; labro simplici, acuto, intus incrassato; aperturâ transversali, dentibus duobus lamellatis internè armatâ; basi plano.

Synonyms and References.

Helix gulàris, *Say. Journ. A. N. S. Philad.*, II. 156.

Description.

Animal. Not hitherto noticed.

Shell. Sub-conical; *epidermis* shining, pale yellowish horn-color; *spire* tending to a point; *whorls* seven, very minute at the apex, increasing in diameter regularly and gradually until they reach the aperture, with very fine oblique striæ; *suture* impressed and distinct; *aperture* transverse, not much expanded; *lip* simple, thin at its edge, within thickened; *base* flat, indented in the centre, near the aperture yellowish-white and opake; *umbilicus* small and rounded in young shells, obsolete or diminished to a mere perforation in older ones; *within the aperture* on the outer lip are two lamelliform, elongated, nearly parallel teeth, one near the base, the other more central.

Greatest transverse diameter more than one fourth of an inch.

Geographical Distribution. Inhabits Pennsyl-

vania, Maryland, Virginia, North Carolina, and Alabama. It is said by Mr. Say to be found in Ohio.

REMARKS. The identification of this and the next described species has long been a desideratum. Specimens of a small shell, with a small and rounded but profound umbilicus, and with two internal teeth, exist in almost every cabinet. In some particulars they resemble HELIX *gulàris*, SAY, in others HELIX *suppréssa*, SAY, and, as the resemblance preponderates in favor of one or the other, they are known by one or the other name. They do not, however, agree entirely with Mr. Say's description of either, and hence some conchologists have supposed that he described from varieties only; but I have recently examined a shell from Alabama, belonging to the cabinet of Mr. Lea, which corresponds perfectly with the description. It is much larger than the common specimens, being one fourth of an inch in diameter, and differs from them in having the umbilicus entirely closed. It has seven full whorls, which are beautifully fine and distinct to the very nucleus, which is uncommonly small. I consider the umbilicated shells to be immature, or not fully developed, though an examination of a larger number may show that the full grown shell is also umbilicated.

The present species resembles HELIX *suppréssa*, which is next described, for which it may be mistaken. It is distinguished from it by the following differences. It has one more whorl; the spire is more conical; the nucleus of the shell is much smaller, so that the first two whorls are finer and more delicate; the base is not so convex, and there are *two* teeth in the aperture.

It is the totality of the characters which make up the species, for individuals differ considerably in the height of the spire, the size of the umbilicus, and in the degree of prominence of the teeth. One tooth is occasionally wanting.

The deposition of testaceous matter, thickening the shell at its aperture, occupies about one fourth of the base through which it is seen. The character of the lamellar folds within the aperture resembles those of Helix *epistylum*, Müller, in which species they are large and prominent, although usually overlooked in the descriptions.

31. HELIX SUPPRESSA.

Plate XI. fig. 3.

H. testâ convexâ sub-depressâ, sub-imperforatâ, nitidâ, luteo-corneâ; anfractibus sex, numerosè et minutè striatis; labro simplici, acuto, intus incrassato; aperturâ transversali, dente unico lamellato armatâ.

Synonyms and References.

Helix suppréssa, *Say. Disseminator of Useful Knowledge. New Harmony, Ill.* 1829.

Description.

Animal. Not hitherto noticed.

Shell. Convex, depressed, pellucid; *epidermis* polished, yellowish horn-color; *spire* flat; *whorls* six, with crowded minute oblique striæ; *suture* impressed, distinct; *aperture* transverse, not expanded;

lip simple, thin at its edge, thickened within; *base* rather convex, near the aperture opake, yellowish white; *umbilicus* small, but rounded and distinct in young shells, obsolete or hardly apparent in older ones; *within the aperture* on the outer lip is a single lamelliform, elongated, oblique tooth.

Greatest transverse diameter nearly one fourth of an inch.

Geographical Distribution. Inhabits Ohio and Pennsylvania, and without doubt may be found in other States.

Remarks. This shell does not correspond exactly with Say's description, but I think it is the same that he described under the same name. Having received from Dr. Ward, of Roscoe, Ohio, a suite of them of different sizes, I notice that the "umbilicus small, orbicular, profound," of Say, exists only in young specimens, it being closed in the elder. The indentation of the umbilical region is not apparent to me.

It resembles very much the preceding species, but has one whorl less, is more depressed, and its base is more convex. The tooth in the aperture is sometimes so little prominent as to be hardly visible. The striæ of growth are fine and crowded, and seem to be more nearly at right angles with the suture than is usual in other species.

32. HELIX LIGERA.

Plate XX. fig. 1.

H. testâ sub-globosâ, perforatâ, nitidâ, corneâ ; anfractibus septem, obliquè striatis; aperturâ lunato-rotundatâ ; labro simplici, acuto ; basi prope aperturam albo, internè incrassato.

SYNONYMS AND REFERENCES.

Helix ligèra, *Say. Journ. A. N. S. Philad.*, II. 157.
Helix Rafinésquea, *Férussac. Hist. Nat. des Moll. Pl.* L., *A. fig.* 5.
Helix Wardiàna, ? *Lea. Trans. Am. Phil. Soc., N. S.*, VI. 67. *Pl.* XXIII., *fig.* 82.

DESCRIPTION.

Animal. Uniform blackish slate-color over the whole upper surface, paler on the posterior extremity and base ; collar grayish-white ; foot narrow, exceeding in length twice the tranverse diameter of the shell.

Shell. Sub-globose, *epidermis* yellowish horn-color, shining ; *whorls* seven, finely and thickly striated transversely ; *suture* not much impressed ; *aperture* semilunate, rounded ; *lip* thin, acute ; *base* and side of the outer whorl within the aperture thickened, and white ; *umbilicus* very minute, nearly closed ; umbilical region impressed.

Greatest transverse diameter five eighths of an inch, usually much less.

GEOGRAPHICAL DISTRIBUTION. Inhabits all the Western States, where it is common. It has been noticed also in the Northwestern Territory.

Remarks. This species varies in the greater or less prominence of the spire, which sometimes is considerably depressed, and at other times rises into a sub-conical shape. The apex is, however, always obtuse, so that the young shells might be supposed to belong to another species, so different are they in shape from the mature shell. When fully grown, there are seven whorls complete, but usually the number does not much exceed six. The epidermis is commonly shining, and the oblique striæ are numerous and distinct. The young shells are pellucid. The base of the shell within the aperture is thickened with a very white callus, which is seen from without. The umbilicus is very small, and sometimes quite closed. The lip, at its junction with the base of the shell is slightly reflected. Helix *Wardiàna* of Lea, is undoubtedly the young of this species. The distinction in the animal, noticed by Dr. Ward, was afterwards ascertained by him not to exist.

Mr. Say's name should be retained for this shell, as his *description* was published several months before Férussac's *name* appeared, and several years in advance of his *figure*. No other description than Say's has hitherto been published.

33. HELIX INTERTEXTA.

Plate XX. fig. 2.

H. testâ sub-pyramidatâ, perforatâ, corneâ; anfractibus striatis, striis obliquis, lineis minutissimis impressis, volventibus, intertextis; anfractu ultimo zonâ sub-albidâ, rufo-marginatâ, cincto; aperturâ lunato-rotundatâ; labro simplici; basi intus incrassato.

Synonyms and References.

Helix intertéxta, *Nobis*.

Description.

Animal. Not hitherto observed.

Shell. Sub-pyramidal; *epidermis* yellowish horn-color; *whorls* six to seven, with numerous fine, oblique striæ, and very minute spiral striæ, intersecting each other; *outer whorl* with a narrow, light-colored band, and an ill-defined brownish band below it; *aperture* rounded, a little transverse; *lip* thin, somewhat thickened within by a deposition of testaceous matter, slightly reflected at its junction with the base of the shell; *umbilicus* small, sometimes nearly obsolete; *base* whiter than the upper surface.

Greatest transverse diameter about three fourths of an inch.

Geographical Distribution. It inhabits North Carolina. I have seen numerous specimens from Cabarrus County. It is also found in Ohio and Pennsylvania.

Remarks. This shell resembles some varieties of Helix *ligèra* so nearly, that I hesitated some time before I considered it distinct. The spire is less high in a shell of the same size, has a smaller number of whorls, and is more pyramidal in shape, than in that species. The diameter, in full-grown specimens, is greater, and the base is flatter. The epidermis is darker and less shining, the shell is thicker and less pellucid, the deposit of testaceous matter within

the aperture is less. The size of the umbilicus and the shape of the aperture are the same in both. But the principal distinction consists in the spiral lines which revolve on the whorl, intersecting the striæ of growth, but so minute as hardly to be perceptible to the naked eye. The whitish, narrow band, shaded below, with rufous apparent on the outer, and sometimes on the second whorl, generally aids in identifying it, though it is sometimes wanting. Young specimens are much more depressed than those of H. *ligèra*, and are sometimes distinctly carinated. The depression of the umbilical region is not so evident in this as in the preceding species.

34. HELIX INDENTATA.

Plate XXII., fig. 3.

H. testâ depressâ convexiusculâ, imperforatâ, tenuissimâ, diaphanâ, nitidâ; ultimo anfractu lineis impressis, distantibus, radiatis ornato; aperturâ transversâ; labro simplici, acuto; basi indentato.

SYNONYMS AND REFERENCES.

Helix indentàta, *Say. Journ. A. N. S. Philad.*, II. 372.

DESCRIPTION.

Animal. Bluish black upon the upper parts; margin and posterior extremity lighter.

Shell. Flattened, thin, pellucid; *epidermis* highly polished, corneous; *whorls* rather more than four, with regular, sub-equidistant, radiating, impressed lines, which on the body-whorl extend to the base, outer whorl expanding towards the aperture; *aper-*

ture rather large, transverse; *lip* simple, very thin, at its inferior extremity terminating at the centre of the base of the shell; *umbilicus* none, but the umbilical region is indented.

Greatest transverse diameter more than one fifth of an inch.

Geographical Distribution. Inhabits Massachusetts, New Jersey, Pennsylvania, and Ohio, and is probably a wide-spread species.

Remarks. This shell is found in the same situations as Helix *arbòrea*, Say, and resembles it very much, particularly on its upper surface. It may be distinguished from it by the outer whorl, which is more spread towards the aperture, by the impressed radiating lines, and by the want of an open umbilicus. The whorls in this species usually revolve in such a manner as to leave no opening between them, but there is an occasional specimen with a well-formed umbilicus.

35. HELIX CHERSINA.

Plate XXVI. fig. 3.

H. testâ minimâ, sub-conicâ, tenuissimâ, pellucidâ, imperforatâ; aperturâ transversâ; labro simplici, acuto; basi convexo.

Synonyms and References.

Helix chérsina, *Say. Journ. A. N. S. Philad.*, II. 156. *Exped. St. Peter's River*, II. 258.

Description.

Animal. Not observed.

Shell. Minute, sub-conical, thin, pellucid; *epidermis* smooth, shining, amber-colored; *whorls* five; *suture* distinct; *aperture* transverse; *lip* simple, acute; *base* convex.

Transverse diameter one tenth of an inch.

Geographical Distribution. Inhabits the sea-islands of Georgia, the hill-sides of Vermont, the Northwestern Territory, and the shores of Fresh Pond near Boston.

Remarks. The above-named localities prove this to be a widely-spread species. Its diminutive size has probably prevented its being observed in other places. It offers but few varieties, and is easily distinguished by its conical form, and thin, amber-colored, transparent shell. Sometimes the outer whorl is slightly carinated. It is found under, and in the interstices of, wet decaying wood, and under layers of damp leaves in the forests.

36. HELIX FULIGINOSA.

Plate XXIV.

H. testâ orbiculato-depressâ, umbilicatâ, rufo-corneâ; anfractibus lævigatis, nitentibus; aperturâ expansâ, sub-orbiculari; umbilico profundo; labro simplici, tenui, acuto.

Synonyms and References.

Helix fuliginòsa, *Griffith, ined.*

Helix lucubràta, *Say. New Harmony Disseminator.* 1829.

Helix lævigàta, *Férussac. Hist. des Moll. Pl.* LXXXII., *fig.* 6.

Description.

Animal. Slate-color, rather darker on the head and neck; foot narrow, terminating acutely.

Shell. Depressed on the upper surface; *epidermis* dark, approaching to chestnut-color, shining and smooth, with very minute, irregular, oblique striæ beneath it; *whorls* rather more than four, the last very voluminous, and expanding transversely towards the aperture; *suture* very little impressed; *aperture* ample, sub-circular, within pearly or iridescent; *lip* simple, thin, brittle, with a light testaceous deposit within; *umbilicus* deep, not much expanded.

Greatest transverse diameter more than an inch.

Geographical Distribution. Has been found in nearly all the Southern, Middle, and Western States. Mr. Say noticed it in Mexico.

Remarks. The color of this shell varies from a light-greenish horn-color to a deep chestnut. The umbilicus varies considerably in size, but it is always distinct and profound. The surface, usually smooth and shining, is occasionally finely and regularly striated. The interior of the aperture exhibits, in perfect specimens, a beautiful pearly lustre.

It is sometimes confounded with the next species, but it may always be distinguished from that by attention to the following particulars. It is a much larger shell, yet the number of whorls is constantly one less; the umbilicus is larger and deeper, the aperture more circular, and the deposit of testaceous matter within is less. The color of the shell is usually much darker. The only living animal of this

species, which has come under my observation, had a very peculiar conical protuberance on the superior part of the extremity of the foot.

This shell, which has been long known in this country by the name which I have adopted, was indicated by *name* by Férussac, in his *Tableau Systématique*, as Helix *lævigàta*, without *description* or *figure.* Mr. Say's *description* appeared in the "New Harmony Disseminator of Useful Knowledge," in 1829, but was almost unknown to naturalists until recently republished. Dr. Griffith's name, appended to specimens in the public cabinets of Philadelphia several years before having in the mean time obtained, it does not appear to be proper to substitute another.

37. HELIX INORNATA.

Plate XXI. fig. 3.

H. testâ orbiculato-depressâ, perforatâ, luteo-corneâ, lævigatâ, nitens; anfractibus quinque; aperturâ transversâ intus incrassatâ; labro simplici tenui, acuto; basi impresso.

Synonyms and References.

Helix inornàta, *Say. Journ. A. N. S. Philad.*, II. 371.

Description.

Animal. Narrow, foot terminating acutely; dark slate-color, glands of the surface not prominent.

Shell. Depressed; *epidermis* yellowish horn-color, smooth, shining, with very minute striæ, not

breaking the smoothness of the surface; *whorls* five; *suture* not much impressed; *aperture* transverse, with a thick, white, testaceous deposit around its whole inner surface a little distant from the margin; *lip* thin, acute, fragile, its lower part reaching to the centre of the base; *umbilicus* small; *base* rather flattened, indented in the centre.

Greatest transverse diameter less than three fourths of an inch.

Geographical Distribution. Inhabits the Western States.

Remarks. This shell resembles the preceding, with which it is often confounded; it is, however, oftener taken to be Helix *gláphyra* of Say, by the naturalists of the West, where the latter, being an introduced species, (Helix *cellària*, Müller,) common only near the sea shore in cellars and gardens, is not found. Though resembling Helix *fuliginòsa* in general appearance, it may be distinguished by the number of whorls, which are five, but which in that species, in specimens twice as large, but little exceed four. Its aperture is much less circular, the transverse diameter being considerably the greatest; the umbilicus is smaller, being nearly closed and more profound; the volume of the last whorl is less in proportion to the size of the shell; the base is flatter; the color lighter, and without the smoky appearance of the former species.

38. HELIX CELLARIA.

H. testâ orbiculato-depressâ, umbilicatâ, tenui, pellucidâ, nitidâ, supra pallidè corneâ, subtus lacteâ; anfractibus quinque; labro simplici, acuto; basi intus incrassato.

Synonyms and References.

Helix cellària, *Müller. Verm. Hist., No.* 230.
Helix nítida, *Drap. Hist. des Moll.*, 117. *Pl.* VIII., *figs.* 23, 25.
Helix gláphyra, *Say. Nich. Encyc. Am. edit.*, IV. *Pl.* I., *fig.* 3.
Helix cellària, *Deshayes. Encyc. Méth., Vers*, II. 214.
Lamarck. Anim. sans Vert., 2d edit., VIII. 70.

Description.

Animal. Upper surface light indigo blue, darkest on the head, neck, and tentaculæ, collar greenish, eyes black. Foot narrow and slender, not much exceeding in length the diameter of the shell, terminating acutely.

Shell. Very much depressed, thin, fragile, pellucid; *epidermis* light greenish horn-color, smooth, highly polished; *whorls* five, slightly rounded, with minute and almost imperceptible, oblique striæ; *aperture* not dilated, its transverse diameter the greatest; *umbilicus* moderate, regularly rounded, deep; *base* rounded, a little thickened within, bluish-white; *lip* simple, acute.

Greatest transverse diameter less than half an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the North-eastern and Middle States, in gardens; is common in the city of Boston in damp cellars.

REMARKS. This is the shell which was found by Mr. Say in gardens, in the city of Philadelphia, and by him described as HELIX *glàphyra*. Its restricted habitat in cellars and gardens long since induced me to suppose it might be an imported species, and a recent opportunity of examining a considerable number of specimens of HELIX *cellària*, MÜLLER, brought from England, enables me to say, that it is absolutely identical with that species. Shells of the same size and growth from the European and American localities cannot be distinguished from each other.

39. HELIX ARBOREA.

Plate XXII. fig. 1.

H. testâ orbiculato-depressâ, tenui, pellucidâ, nitidâ, umbilicatâ; aperturâ sub-rotundatâ; labro simplici, acuto.

SYNONYMS AND REFERENCES.

Helix arbòrea, *Say. Nich. Encyc., Am. edit.,* IV. *Pl.* IV., *fig.* 4.
Férussac. Hist. Nat. des Moll. Prodr., No. 219.

DESCRIPTION.

Animal. Head and tentaculæ blackish, upper parts bluish, posterior parts whitish, transparent. Foot thin and narrow.

Shell. Depressed, very slightly convex, thin, pellucid; *epidermis* convex, shining; *whorls* about four, with very minute, oblique striæ, apparent when viewed with a microscope; *aperture* somewhat rounded; *lip* thin, acute; umbilical region indented; *umbilicus* moderate, well developed, round, and deep.

Transverse diameter commonly about one sixth of an inch, sometimes attains one fourth of an inch.

Geographical Distribution. Has been noticed in nearly every part of the United States.

Remarks. This is a very common species, inhabiting forests, cultivated fields, and gardens. A situation of which it seems very fond is in the crevices of wet, decaying wood. It resembles the preceding species in shape, but is much smaller. It resembles still more Helix *lùcida*, Drap., and Férussac considered it to be only a variety of that species. A comparison of the two shows distinctions which must, I think, prevent their being considered identical. Our shell is larger, and has its umbilicus more developed in proportion to its size; the immediate circumference of the umbilicus is more impressed. In shells of the two species of the same size, the foreign one has one more whorl. In their general aspect the two are so unlike, that it is easier to separate them than to describe their differences.

40. HELIX ELECTRINA.

Plate XXII. fig. 2.

H. testâ parvâ, depressâ, umbilicatâ, tenui, pellucidâ; anfractibus quatuor, striatis; aperturâ rotundatâ, labro simplici.

Synonyms and References.

Helix eléctrina, *Gould. Mollusca of Massachusetts.* (Unpublished.)

Description.

Animal. Not noticed.

Shell. Small, depressed, thin, fragile; *epidermis* amber-colored, wrinkled, shining; *whorls* four, the last rapidly enlarging towards the mouth; *aperture* rounded; *lip* simple, its edge rather thickened, not acute; *umbilicus* small, but well marked and constant.

Greatest transverse diameter more than one eighth of an inch.

Geographical Distribution. Found hitherto only on the shores of Fresh Pond, near Boston.

Remarks. For the following remarks I am indebted to Dr. Gould. "In size, the depressed-conical shape of the upper surface, the number of whorls, and the rapid enlargement of the largest whorl, this shell corresponds with Helix *indentàta.* It differs in its darker, smoky horn-color, its constant umbilicus, its rather thick and shining lip, and in its whitish wrinkles, which, instead of being remote, are crowded. From Helix *arbòrea* it differs in having one whorl less, the last one rapidly dilating, its apex not being depressed, its thinner structure and more glossy surface, and in its somewhat smaller umbilicus. In Helix *arbòrea* the lip has a flexuous curve, but is nearly a direct section of the whorl in this. Though all of the same size and general appearance, the three

may be readily separated when mingled. Indeed its claims as a distinct species are not very obvious without viewing the three together. It is found abundantly under fragments of wood in damp places near the water's edge, in company with Helix *chérsina* and Pupa *modésta.* I have never seen it in company with either Helix *indentàta* or Helix *arbòrea*, and it seems to differ from them widely in habit, in thus preferring the vicinity and even encroachment of water."

41. HELIX MULTIDENTATA.

Plate XXII. fig. 5.

H. testâ minimâ, orbiculato-depressâ, umbilicatâ, tenuissimâ, pellucidâ, nitidâ, supra planulatâ; anfractibus sex obliquè et minutè striatis; aperturâ semi-lunatâ, angustâ; labro simplici, acuto; umbilico parvo.

Synonyms and References.

Helix multidentàta, *Nobis.*

Description.

Animal. Rosy-white, thread-like.

Shell. Depressed, sub-planulate above, very thin, pellucid; *epidermis* smooth, shining; *whorls* six, very narrow, revolving in the same plane, and not enlarging towards the aperture, with minute, raised, oblique striæ; *suture* distinct; *aperture* semi-lunate, narrow; *lip* acute; *umbilicus* very small, rounded, not exhibiting any of the volutions; *base* convex, indented around the umbilicus. Two rows of very

minute white teeth, radiating from the umbilicus, are seen through the shell, within the base of the last whorl.

Greatest transverse diameter one eighth of an inch.

Geographical Distribution. Noticed hitherto only in Vermont, on the eastern slopes of the Green Mountains.

Remarks. This species, now described for the first time, possesses characters so marked, that it is not likely to be mistaken for any other. The numerous narrow whorls visible on its upper and plane surface, while only one is seen below, together with its minute, round umbilicus, and narrow aperture, would sufficiently distinguish it; but there is another character still more peculiar. There are two rows of very minute, delicate, white teeth on the lower side of the interior of the last whorl, radiating from the centre. One row is usually so near the aperture as to be seen within it with the aid of a microscope, the other is more or less remote; each row contains five or six distinct teeth. Both of them are visible through the shell. The transparency of the shell is so great, that frequently the sutures of the upper surface can be seen through it when viewed on the base. With the living animal within, the shell has a roseate tinge.

42. HELIX SOLITARIA.

Plate XXIII.

H. testâ orbiculato-convexâ, latè umbilicatâ, corneo rufescente, fasciis fuscis aut rufis cinctâ; aperturâ circulari; labro simplici; basi unicolore.

SYNONYMS AND REFERENCES.

Hèlix solitària, *Say. Journ. A. N. S. Philad.*, II. 157.

DESCRIPTION.

Animal. Dirty white, with a rufous tinge; rufous spots on the head and neck, lighter ones along the margin. Tentaculæ dark; foot short, posterior extremity rounded.

Shell. Very convex, thick, apex obtuse; *epidermis* dark corneous, with brown, revolving, rufous bands, of which there are usually two on the body-whorl; *whorls* six, striated and rounded, the last whorl making a considerable part of the volume of the shell; *suture* distinctly impressed; *aperture* ample, rounded, space between the two extremities of the lip small, with a thin callus, within bluish white, showing the bands; *umbilicus* large and deep, exhibiting all the volutions; *base* destitute of bands.

Greatest transverse diameter more than one inch and a quarter.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States north of the Ohio river. It was noticed by Mr. Say in lower Missouri.

REMARKS. This is a thick and coarse shell when fully grown. It is distinguished by its deep and ample umbilicus, and the dark rufous bands on its whorls. The spire varies considerably in the degree of its elevation, but the apex is always obtuse. The same specific name was applied by Poiret * to a

* "Prodrome des Coquilles fluviatiles et terrestres," &c.

French species, but, Draparnaud's name for the same shell (H. *conóidea*) having universally obtained, the present name can be retained for our species.

43. HELIX ALTERNATA.

Plate XXV.

H. testâ orbiculato-depressâ; latè et profondè umbilicatâ; striis elevatis, obliquis, crebris, scabrâ; albido et rufo alternè coloratâ; obscurè fasciatâ; aperturâ circulari; labro tenui, acuto.

Synonyms and References.

Helix alternàta, *Say. Nich. Encyc., Am. edit.*, IV. *Pl.* I., *fig.* 2.

Férussac. Hist. des Moll. Pl. LXXIX., *figs.* 8, 9, 10.

Deshayes. Encyc. Méth, Vers, II. 219.

Helix scàbra, *Lamarck. Anim. sans Vert.*, 2d *edit.*, VIII. 66.

Lister. T. 70., *fig.* 69.

Description.

Animal. Head and tentaculæ light slate-color, back brown, remainder of upper surface brownish-orange, eyes black, base of foot greyish-white, collar saffron. Superior tentaculæ one third of an inch long, blackish at the extremities. Foot not much exceeding in length the diameter of the shell, and terminating in a broad, obtuse, and flat extremity. A light marginal line runs along the edge of the foot from the head to the posterior part, those of the two sides meeting in an acute angle.

Shell. Flattened-convex; *epidermis* variegated, with rufous bars, and spots arranged obliquely across the whorls; *whorls* in full-grown individuals six, striated obliquely with raised, acute, equidistant, curved lines, which give a roughness to the surface; *aperture* viewed perpendicular to its plane nearly circular; *lip* simple, thin, brittle, within shining, sometimes pearly; *umbilicus* large and deep, exhibiting all the volutions; *base* paler than the upper surface, with a colored band more or less perfect, the colored bars where they exist narrow, and converging into the umbilicus.

Greatest transverse diameter about one inch.

Geographical Distribution. Inhabits the North-eastern and Middle States, and the Western States from the eastern end of Lake Superior to Arkansas. It will probably be found to exist in the whole territory of the United States.

Remarks. In New England this is perhaps the most common of the genus. It abounds in the forests, and is not uncommon in the open country in moist situations, where it can find shelter under logs and stumps. It seems to be more gregarious than other species; at any rate numbers are more frequently found in the same retreat. It does not bear a change from a moist to a dry situation so well as many other species. In captivity it remains buried a great part of the time under the moist earth, with the body half protruded. If removed to the surface, it withdraws within the shell, protects its orifice by three or four coverings, and soon dies unless supplied with moisture.

The foot of the animal is smaller, and the tentacula shorter, than in either of the other species possessing so large a shell; it is also flatter and thinner. The collar is deeply tinged with the coloring matter which ornaments the shell, and which is sometimes secreted in such profusion, as to give a saffron tinge to the trace which it leaves on objects over which it crawls. It is distributed over the animal, and arranged in minute points, which are most thickly clustered on the margin, and on the glandular tubercles of the surface.

The shell varies in being more or less depressed, and having the striæ more or less rough. In the young shell the margin is carinated, especially at its junction with the second whorl. On many individuals there is a distinct, uncolored line on the centre of the outer whorl, dividing the rufous bands of the superior surface from one on the lower surface.

This species was described by Mr. Say, in 1818, as HELIX *alternàta*. In 1822, Lamarck gave it the specific name of *scàbra*, a name pre-occupied by a species of Chemnitz. Say's name has the priority and is adopted in this country, as it should be elsewhere.

44. HELIX PERSPECTIVA.

Plate XXI. fig. 4.

H. testâ parvâ, orbiculato-depressâ, sub-discoideâ, latè umbilicatâ, rufescente; anfractibus convexiusculis, scabris, striis transversis elevatis, distinctis; aperturâ sub-rotundatâ, depressâ; labro simplici, acuto.

Synonyms and References.

Helix perspectiva, *Say. Journ. A. N. S. Philad.*, I. 18. *Nich. Encyc., Am. edit.*, IV.
Férussac. Hist. des Moll. Pl. LXXIX., *fig.* 7.
Lamarck. Anim. sans Vert., 2*d edit.*, VIII. 130.

Helix párvula, ? *Deshayes. Encyc. Méth., Vers*, II. 217.

Description.

Animal. Head and tentacula bluish black; margin and posterior part of foot white. Foot transparent, narrow, less in length than twice the diameter of the shell, terminating acutely.

Shell. Very much depressed, almost discoidal; *epidermis* reddish brown, immaculate; *whorls* six, with numerous, elevated, strongly marked, transverse striæ; *suture* deeply impressed; *umbilicus* very much expanded, cup-shaped, exhibiting all the volutions; *aperture* rounded, depressed; *lip* simple, thin.

Greatest transverse diameter three eighths of an inch.

Geographical Distribution. Inhabits the Western States, and was noticed by Mr. Say in the Northwestern Territory. It is commonly supposed to exist in Massachusetts and other New England States, but, so far as my own observation extends, it is replaced in those States by Helix *striatélla*, the next described species, which it very much resembles.

Remarks. This is a common shell in those parts of the country which it inhabits. In Ohio it is

particularly abundant, vast numbers of them being sometimes found under the bark of a single decaying tree. The striæ of increase on the upper surface are remarkably prominent, and almost angular, and serve to distinguish it from every other species; on the lower surface they are very distinct, but less prominent, and the direction of their curve is the reverse of that above; they converge into the umbilicus. It varies considerably in size, and young shells are often carinated. In mature individuals there is a single sub-prominent tooth on the base of the shell within the aperture. It resembles Helix *rotundàta*, Müller, but is destitute of the alternate markings of that species. There cannot be a doubt that Helix *pàrvula*, Deshayes, is identical with this shell, as his description will not apply to any other than this and the following species, and the angulated character of the striæ sufficiently point to this.

There is a Helix described under the same specific name by Wagner, in Spix's *Testacea of Brazil;* but, as this did not appear until ten years after Mr. Say's publication, a new name must be adopted for the Brazilian species.

45. HELIX STRIATELLA.

Plate XXI. fig. 5.

H. testâ parvâ, orbiculato-depressâ, tenui, latè umbilicatâ, corneâ; anfractibus quatuor, convexis, obliquè et minutè striatis; aperturâ transversâ, sub-rotundatâ; labro tenui, acuto.

Synonyms and References.

Helix striatélla, *Anthony. Bost. Journ. Nat. Hist.*, III. 278.

DESCRIPTION.

Animal. Not hitherto observed.

Shell. Depressed-convex, thin; *epidermis* light horn-color; *whorls* less than four, with numerous, delicate, oblique striæ; *suture* distinct, not much impressed; *umbilicus* large, showing all the volutions; *aperture* rounded, transverse; *lip* thin, acute.

Greatest transverse diameter less than one fourth of an inch.

GEOGRAPHICAL DISTRIBUTION. Inhabits the Western States, is common in Ohio, and particularly abundant near Cincinnati, "in low bottom-lands, near the margins of running streams." It is also abundant in Massachusetts, near Boston, and in Vermont.

REMARKS. This species bears a very strong resemblance in general aspect to HELIX *perspectiva*, SAY, with the immature shells of which it is very commonly confounded. It needs some attention to separate the two; but, when the present species is once noticed, it cannot fail to be considered very distinct. Its discriminative characters, as compared with the preceding species, are as follows. The mature shell is smaller, and has generally rather less, and never more, than four whorls, and in shells of the same size the number of volutions is less. It is thinner and more delicate; its color is lighter; its striæ of increase are more numerous, more oblique, much finer, and less prominent; its suture is less deeply impressed; its spire is more convex; and its umbilicus less expanded. The character of the

aperture is the same in both. The lustre of the epidermis resembles that of satin.

46. HELIX LIMATULA.

Plate XXI. fig. 2.

H. testâ parvâ, orbiculato-depressâ, umbilicatâ, tenui, albidâ; anfractibus quatuor, convexis, obliquè et minutissimè striatis; aperturâ sub-circulari, tenui, acuto.

Synonyms and References.

Helix limátula, *Ward. ined.*

Description.

Animal. Not observed.

Shell. Small, convex-depressed; *epidermis* white, immaculate; *suture* distinctly impressed; *whorls* more than four, convex, with very fine, oblique, parallel striæ, which become obsolete on the base; *aperture* sub-circular, slightly modified by the penultimate whorl; *lip* thin, acute; *umbilicus* large and deep, not exhibiting all the volutions.

Greatest transverse diameter about one fifth of an inch.

Geographical Distribution. Has been found in many places in Ohio and in Indiana. It probably inhabits all the low grounds bordering on the Ohio and its tributaries.

Remarks. This shell resembles in a considerable degree the preceding, particularly when the epidermis of that species has become bleached, but may be readily distinguished from it on comparison. Its epi-

dermis is lighter, being nearly white; it is smaller, yet has one more whorl; it is less convex, and the whorls are less prominent; the striæ of increase are finer and more delicate, and their direction is more nearly at right angles with the suture; the aperture is more nearly a direct section of the whorl; the body-whorl is more rounded on the base; the umbilicus is less spread or cup-shaped, and, though deep, does not exhibit all the volutions. The nucleus of the shell or the original whorls, which exist when the animal leaves its egg, are much more minute and delicate.*

47. HELIX MINUSCULA.

Plate XXII. fig. 4.

H. testâ minutâ, orbiculato-depressâ, umbilicatâ, albidâ; anfractibus quatuor, convexis; aperturâ circulari; labro simplici, acuto.

Synonyms and References.

Helix minuscula, *Nobis.*

Description.

Animal. Not observed.

* For this species and description I am indebted to the kindness of my late friend, C. J. Ward, M. D., of Roscoe, Coschocton County, Ohio, who has passed away from among us since this paper was begun. Dr. Ward was known to most of the naturalists of the United States, and was distinguished for his uniformly liberal intercourse with them. He seemed to possess no exclusive or selfish feelings in matters of science, but was always ready to impart his stores of knowledge, his assistance, and his time, to those who were engaged in pursuits similar to his own. His loss will be deeply regretted by his numerous correspondents, as well as by his personal friends. He died at his residence in August last, after a very short illness.

Shell. Minute, depressed-convex; *epidermis* whitish; *whorls* four, convex; *suture* very distinctly impressed; *aperture* nearly circular; *lip* thin, acute; *umbilicus* large, not spread, and exhibiting not more than two volutions; *base* rounded on the body-whorl.

Greatest transverse diameter less than one eighth of an inch.

Geographical Distribution. Found in Ohio, on the margins of streams, under chips or sticks in damp, shaded situations, or under the bark of decaying stumps near the surface of the waters. Professor C. B. Adams has lately found it in Vermont.

Remarks. This minute shell is but little larger than Helix *pulchélla*, which it resembles somewhat on its upper surface. It also bears some resemblance to small specimens of the preceding species. It has four full whorls, with deep sutures; is handsomely rounded; has a circular aperture, and a large umbilicus, which exhibits about two volutions. Its striæ of increase are too minute to be visible by the eye. I do not know any species with which it is likely to be confounded.

48. HELIX LINEATA.

Plate XXII. fig. 6.

H. testâ discoideâ, supra planulatâ, subtus concavâ, corneo-viridescente; anfractibus quatuor, lineis parallelis, volventibus, sub-elevatis; umbilico lato, expanso; labro simplici; faucibus dentibus binis armatis.

Synonyms and References.

Helix lineàta, *Say. Journ. A. N. S. Philad.*, I. 18; II. 273.

Férussac. Hist. Nat. des Moll. Pl. LXXIX., *fig.* 1.

DESCRIPTION.

Animal. Whitish, transparent, thread-like.

Shell. Discoidal; *epidermis* greenish; *whorls* about four, visible on the base of the shell as well as above, with numerous, equidistant, parallel, raised lines revolving upon them; *suture* much impressed; *aperture* semilunate, narrow, not expanding; *lip* thin; *umbilicus* wide, forming a concave depression of the base, each volution visible to the apex; within the aperture, on the external circumference, are placed two pairs of minute, conical, white teeth, the first pair in sight when looking into the aperture, the other more remote.

Greatest transverse diameter one eighth of an inch, usually less.

GEOGRAPHICAL DISTRIBUTION. Inhabits the New England States and Pennsylvania. Common in Vermont.

REMARKS. This peculiar shell is distinguished by its discoidal form, greenish color, the fine revolving lines upon its whorls, and the singular teeth which are placed in the interior of the outer whorl. These teeth are arranged in pairs on the external side of the parietes of the cavity, one of each pair being on the superior and one on the inferior part of the whorl. They are prominent, white, and conical, and may be discovered through the semi-transparent shell. One pair is so near the aperture as easily to be seen on looking into it; the other is distant nearly one half a

volution from the lip, and is of course invisible except through the shell. At least one pair will be found to exist in every specimen, when carefully sought for; in one instance I noticed a third pair still further within the whorl.

I have hitherto noticed this species under the bark, or in the interstices, of wet and decaying wood.

ART. II.—FURTHER NOTICES OF SOME NEW ENGLAND LICHENES. By Edward Tuckerman, Jr., LL. B., a Member of the Society. (Read March 17th, 1841.)

Besides an enumeration of a few species, which, though not rare, I have not previously noticed, this paper contains descriptions of one or two lichens that appear to be new, from the New Hampshire mountains. And, it having been suggested that a compendious view of the systematic arrangements of the Lichenes, with some brief notices of the uses of these plants, would not improperly form a part of the article, I have attempted some account of these topics, at the end.

Verruca'ria *compósita*, Schwein. in Hals. Syn. View Lich. N. Y. p. 9., (cum Ic.)—Trees; common. A remarkable species, and agreeing in every respect with the description cited. The thallus is polished, and of a yellowish brown; the apothecia nearly as large as those of V. gemmata, mostly immersed, and occurring in clusters of two to twelve and more.

THELOTRE'MA *lepadinum*, Ach. Meth. p. 132., Lichenogr. p. 312. (cum Ic.) Schær.! Lich. Helvet., Moug. & Nestl.! Stirp. Crypt., Wallr. Fl. Crypt. Germ., Hook.! Br. Fl., Antrocarpum inclusum, Spreng. Syst., Endocarpon inclusum, Wahlenb. Fl. Suec., Volvaria truncigena, De Cand. Fl. Fr., Lichen lepadinus, Ach. Prodr. L. inclusus, Sm. Eng. Bot. 8., n. 89. (cum Ic.)—Old trunks. Our plant agrees with the above-cited specimen from Hooker, in the herbarium of Mr. Greene, and also with the other foreign specimens. This species is mentioned in Mr. Halsey's "View," as common; but with a mark of doubt, and an intimation that his lichen is "probably new." The plant of my list seems to be very rare, and I suppose, is not the same with that of Halsey.

LECIDE'A *incàna*, Hook. l. c., Patellaria incana, Spreng. l. c., Lepraria incana, Ach. Meth. p. 4., Lichenogr. p. 665., Moug. & Nestl.! l. c., Wahlenb. Fl. Lapp., Muhl. l. c. Torr. l. c., Lichen incanus, Schreb., Byssus incana, L.—Moist rocks in mountain forests. At the Floom, in Lincoln, N. H., plentiful. The discovery of perfect patellulæ on this plant in Britain, caused its removal from the Leprareæ. It is of a remarkable byssus-like habit, and I have seen no lichen resembling it, unless it be Parmelia lanuginosa; which has however a rigid thallus, the surface only being like our plant. Specimens occurred at the above station, in regard to which I am unable to determine whether they are fragments of Parmelia, incrusted with our Lecidea, or the Lecidea itself in its mature state. In the latter case the plant is a

Parmelia, and the form called Lecidea incana, the young state. No authors, that I have seen, appear to suggest any affinity between Parmelia lanuginosa and Lecidea incana, and I therefore leave this question for further consideration.

L. *Oedèri*, Ach. Meth. p. 49., Hook. l. c., Mass. Catal., (with a qu.) — Rocks; White Mountains; frequent. The synonymy of this plant indicates considerable difference of opinion among authors. Sprengel considers it a variety of L. atro-alba, colored by the iron of the rocks on which it grows. This view, as to the color, was taken in the former of these papers, where the plant was referred to Urceolaria. According to Hooker, Schærer, in one of his works, pronounced the species "a true Urceolaria." Schærer quotes "Ach. MSS. 1818," for the name Gyalecta Oederiana. It is made a variety of his Patellaria confluens by Wallroth. I still think it belongs to the Acharian genus Urceolaria: but it appears to be the Lecidea Oederi of our authorities. There are many species which, in the language of Turner and Borrer, "place difficulties apparently insuperable, in the way of a satisfactory arrangement of the Lichens."

L. *icmadóphila*, Ach. Meth. p. 58., Lichenogr. p. 191., Schær.! l. c., Moug. & Nestl.! l. c., Hook. Br. Fl., Muhl. Catal., Torr. Catal., Patellaria icmadophila, Wallr. l. c., P. æruginosa, Spreng. l. c., Lichen icmadophila, Ehrh. (cit. auctt.) L. æruginosus, Scop. Carniol., Ach. Prodr. — Decayed trunks; mountains of New England, very frequent. Much resembling Bæomyces roseus, with which it was confounded by

Linnæus, and to which genus it was referred in the Flora of De Candolle.

L. *polýtropa*, Ach. Meth. p. 72., Hook. l. c., Patellaria polytropa, Hoffm., (cit. Spreng.) Spreng. l. c., Wallr. l. c., Lecidea Ehrhartiana, *β.* polytropa, Ach., Lichenogr. p. 192., Schær. ! l. c., Moug. & Nestl. ! l. c., Hals. l. c., Lichen polytropus, Ehrh., Ach. Prodr. — & Lecidea Ehrhartiana, Lichen Ehrhartianus, Ach., Hals., cæt. que. — Rocks; Franconia Mountains. The form, with smaller patellulæ, which is the L. Ehrhartiana of authors, is united by Sprengel with this species. It occurs on wood, (and also "common on rocks," Hals.) and is enumerated in the Mass. Catalogue.

Lecanòra *cerìna*, Ach. Lichenogr, p. 390., Schær. ! l. c., Moug. & Nestl. ! l. c., Hook. l. c., Parmelia cerina, Ach. Meth., Wallr. l. c., Patellaria cerina, Hoffm. (cit. Cand.) De Cand. l. c., Lichen cerinus, Hedw., Ach. Prodr. — Trees, not uncommon. The line between this, and other species allied to it, and some species of Lecidea, is hardly perceptible. Meyer and Sprengel consider this plant one of the forms of Parmelia parietina, in the young state. Wallroth is much excited by this arrangement: "nec sicut," he says, "Sprengelius *ex fonte spurco* vix vero ad Naturæ mentem perhibuit, Parmeliæ parietinæ subscribenda." (l. c. p. 472.)

Squamà'ria *saxícola*, Hook. ! l. c., Lecanora saxicola, Ach. Lichenogr. p. 431., Schær. ! l. c., Parmelia saxicola, Ach. Meth. p. 191., Spreng. l. c., Wallr. l. c.,

Placodium ochroleucum, De Cand. l. c., Moug. & Nestl. ! l. c., Lichen saxicola, Pollich, Ach. Prodr. — Tombstones in the (Old) Cambridge burying-ground. A pretty species. Specimen v. s. ex Hook. in herb. Greene.

S. *élegans*, Hook, l. c., Lecanora elegans, Ach. Lichenogr. p. 435., Schær. ! l. c., Hals. l. c., Parmelia elegans, Ach. Meth. p. 193., Wallr. l. c., Lichen elegans, Link, Ach. Prodr. — With the last; and on pebbles, Cambridge Common.

Parme'lia *Halseyàna:* thallo substellato pallide flavo-virescente nigro-punctato, subtus albo fuscescente fibrilloso, laciniis angustis imbricatis ad centrum rugosis concretis; scutellis badiis margine integro. Mountain rocks. — Notch of the White Mountains, abundant. Alpine rocks on the Franconia Mountains; and the higher peaks of the Green Mountains, Vt. I have ventured to name this in honor of the learned author of the "Synoptical View of New York Lichens." The lichen resembles P. conspersa, and P. centrifuga, the latter of which I am only acquainted with through the descriptions. It is distinguished from the former by its different habit, and the color of the under surface; and from the latter by the presence of the little black apophyses on the upper surface, which are also observable on P. conspersa. The color is much brighter than in P. conspersa, and the plant is handsomer.

P. *aleurites*, Ach. Meth. p. 208., Ach. Lichenogr. p. 484., Moug. & Nestl. ! l. c., Spreng. l. c., Wallr. l. c., Hook. ! l. c., Hals. l. c., Mass. Catal., Lichen

aleurites, Ach. Prodr., Lichen diffusus, Dicks. — Old rails; Cambridge, and elsewhere, not very uncommon.

P. *crinita*, Ach. Syn. (cit. Hals.) Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal. (with a qu.) — Trunks, and stones. Acharian woods, Cambridge; and elsewhere, not uncommon. One of the largest and finest forms of the genus. Our plant is probably that noticed by the above authors, and it is peculiar to the North American Flora. Muhlenberg notes it "N. S." in his catalogue, from which we may infer that it was one of those which he discovered and sent to Acharius. The apothecia seem to be wholly unnoticed, both in the brief description of Halsey, and in the longer one given in Eaton's "Manual." These commonly occur at the Cambridge station of our plant, and are well worthy of notice. They become very large, rufous, with margins irregularly lacerated, and beset with the same coral-like branched apophyses, which form so remarkable a feature (distinguishing also several other allied American species,) of the upper surface of the thallus. These apothecia are near the margin, and sub-pedicelled, and much resemble those of P. perforata, with which species our plant, in habit, generally agrees.

P. *stellàris, β. aipòlia*, P. aipolia, Ach. Meth. p. 209., Lichenogr. p. 477., Schær.! l. c., Muhl. l. c., Mass. Catal., P. homochroa, β. platyphyllina, Wallr. l. c., Lichen aipolius, Ach. Prodr. — Trees and old rails, Cambridge, and elsewhere, common. Sprengel does not allow this even the rank of a variety. Our plant seems to agree with Schærer's specimens, and to

differ from P. stellaris in the characters denoted by Acharius.

Peltìgera *polydáctyla*, Hoffm. (cit. Schær.) De Cand. l. c., Schær.! l. c., Spreng. l. c., Wallr. l. c., Peltidea polydactyla, Ach. Meth. p. 286., Lichenogr. p. 519., Moug. & Nestl.! l. c., Hook, l. c., Muhl. l. c., Lichen polydactylus, Ach. Prodr. — On the ground; mountain forests. About the White Mountains, and the Franconia Mountains, common. The character to which this species owes its name is quite marked in my plants, which also differ from the other species in the habit of the thallus.

P. *rufèscens*, Hoffm., Spreng. l. c., E. T. Enum. Lich. N. Eng., & P. spuria, Ejusd. — Sands; Cambridge, Ipswich, and elsewhere. Sprengel and Wallroth consider P. spuria not distinct from P. rufescens. Hooker's remarks seem also in favor of this view, though he keeps the two species separate.

P. *aphthòsa*, Hoffm. (cit. Schær.) De Cand. l. c., Schær.! l. c., Spreng. l. c., Wallr. l. c., Peltidea aphthosa, Ach. Meth. p. 287., Lichenogr. p. 516., Moug. & Nestl.! l. c., Hook. l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal. — On the ground; mountain woods, throughout the northern parts of New England. The largest and handsomest of our species.

Gyróphora *spadochroa*, Ach. Meth. p. 108., Lichenogr. 229. 673., Moug. & Nestl.! l. c., Graphis vellea, δ. discolor, Wallr. l. c., Lecidea hirsuta, part. Spreng. l. c., Umbilicaria depressa, β. spadochroa,

Schær.! l. c., Gyrophora vellea, β. spadochroa, Ach. Syn. (cit. Wallr.), Gyromium velleum β. spadochroum, Wahlenb. Fl. Suec., Gyrophora hirsuta β. spadochroa, Floerke, (cit. Wallr.) Lichen spadochrous, Ach. Prodr. — Alpine Rocks; Franconia Mountains. The original Lichen velleus was a plant of Lapland. Acharius had seen but a single Lapland specimen when he wrote the descriptions of this and the allied species in the "*Lichenographia.*" In the Addenda to the "*Lichenographia,*" he says that he has received very large specimens of G. spadochroa from North America, which, he thinks, may be what others had called G. vellea. Our plant is smaller than what is commonly taken for G. vellea, and appears quite distinct. It occurred without apothecia.

Cetrària *Oakesiàna:* thallo subcoriaceo expanso glabro viridi-flavescente, subtus pallide castaneo, laciniis planis adscendentibus marginibus elevatis nigrociliatis demum pulverulentis; peltis rufo-fuscis margine integro. C. virescens, E. T. Further Enum. Lich. N. Eng. — On trees; mountain woods. White Mountains. Franconia Mountains. Green Mountains in Vt. Also Plainfield, Porter!. A description of this apparently new species from imperfect specimens, was given in my former article in this volume, and the specific name virescens proposed. There being already a C. viridis of Schweinitz, and the examination of better specimens having made it necessary to alter considerably my description, I now dedicate the species to my excellent friend William Oakes, Esq., of Ipswich; to whom, it is the least

that we can say, New England still looks for her FLORA.

C. *lacunòsa*, Ach. Meth. p. 295 (cum Ic.), Lichenogr. p. 508., Muhl. l. c., Hals. l. c., Mass. Catal. Lichen cavernosus, Menzies, (cit. Ach.) — Old rails and trees; throughout New England. Massachusetts, Greene !.

C. *ciliàris*, Ach. Lichenogr. p. 508., Muhl. in Ach. l. c., Ejusd. Catal. l. c.; Hals. l. c., Mass. Catal., Parmelia Muhlenbergii, Spreng. l. c. — Old rails and trees, common. A small form, apparently the young plant, which I have gathered in the subalpine region of the White Mountains, and have also received from Dr. Porter, resembles very much C. sepincola, an European species, but so far as I have observed, is always distinguishable from that species, by the presence, more or less, of ciliæ. It may be added, that this form here referred to, occurred, in both instances, as is common with a similar form of C. sepincola in Europe, (of which specimen v. s. ex Hooker, in herb. Greene,) in company with C. juniperina β. pinastri. Besides the character of ciliation, this species differs, says Acharius, from the foreign one, in being, as is evident, in the comparison of specimens, "multo major atque solidior."

RAMALÌNA *polymórpha*, Ach. Lichenogr. p. 600., Schær. ! l. c., Hook. l. c., Muhl. l. c., Hals. l. c., Mass. Catal., Parmelia scopulorum, α. platycladodes, Wallr. l. c., P. polymorpha, Ach. Meth. p. 265., Spreng. l. c., Lichen polymorphus, Ach. Prodr. — Walls and stones, not uncommon. Essex co. Oakes!.

Also Plainfield, Dr. Porter!. Chelmsford, Mr. Russell!. A more delicate form, resembling the var. tenuis, Ach., Schær. !, is common on fences.

R. *fastigiàta*, Ach. Lichenogr. p. 603., Moug. & Nestl. ! l. c., Hook. l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal., Parmelia populina, α. fastigiata, Wallr. l. c., Physcia fastigiata, De Cand. l. c., Parmelia fastigiata, Ach. Meth. p. 260., Spreng. l. c., Lichen fastigiatus, Pers. Ach. Prodr. — Trees and fences; very common. Generally distinguishable by its fastigiate habit, and large sub-terminal apothecia.

R. *fraxínea*, Ach. Lichenogr. p. 602., Schær. ! l. c., Hook. ! l. c., Muhl. l. c., Torr. l. c., Hals. l. c., Mass. Catal., Physcia fraxinea, De Cand. l. c., Mich. Fl. Bor. Amer., Moug. & Nestl. ! l. c., Parmelia fraxinea, Ach. Meth. p. 258, Spreng. l. c., Wallr. l. c., Lichen fraxineus, L., Walt. Fl. Carol., Ach. Prodr. — Trees; common. A more rugose habit of thallus, and differently situated apothecia distinguish this species from the preceding.

R. *farinàcea*, Ach. Lichenogr. p. 606., Schær. ! l. c., Moug. & Nestl. ! l. c., Hook. l. c., Parmelia calycaris, β. chraumatica, Wallr. l. c., Physcia farinacea, De Cand. l. c., Parmelia farinacea, Ach. Meth. p. 263, Spreng. l. c., Lichen farinaceus, L., Ach. Prodr. — Rocks and trees; White Mountains; very abundant in the Notch. Our plant agrees with the cited specimen from Hooker in Mr. Greene's herbarium, and also with the other foreign specimens. It is very distinguishable, by its delicate habit, and numerous soredia.

CLADÒNIA *unciàlis,* var. *reticulàta,* Russell! in Essex Journ. Nat. Hist. — Hingham, Russell ! l. c. Also in the Alpine regions of the White Mountains, and the Franconia Mountains. My Alpine lichens are considered by Mr. Russell identical with his curious variety. It seems very different from any of the European forms, given by Schærer.

C. *filifórmis,* Schær. !, Scyphophorus filiformis, Hook. l. c., Patellaria macilenta, Wallr. l. c., Cladonia polydactyla, Spreng. l. c., C. macilenta, Hoffm. (cit. Wallr.), Cenomyce macilenta, Fries, (cit. Wallr.), C. bacillaris, Ach. Syn. (cit. Wallr.), Moug. & Nestl.! l. c., Muhl. l. c., Hals. l. c., Mass. Catal. Bæomyces macilentus Wahlenb. l. c., B. bacillaris, Ach. Meth. p. 329., Lichen macilentus, Ehrh. (cit. Wallr.), L. filiformis, Huds., Ach. Prodr. — Alpine region of the White Mountains.

These are all the lichens, out of a pretty large collection, excluding some very common and well-known species, which it was not necessary to repeat any reference to, that I have been able to determine. And these I should not have ventured to bring before this Society, but for the assistance of two foreign works of great importance to the study of these plants; — that of Schærer, of Swiss lichens, and the less complete but excellent "*Stirpes Cryptogamæ*" of Mougeot and Nestler; the former belonging to the collections of the University, and the latter kindly lent me by Mr. Greene. I have little doubt in regard to the correctness of the greater part of the references of our lichens to established species, given

in these papers.* But the path is by no means a smooth one, and the errors that may be found to occur, will, I hope, meet with due consideration. To William Oakes, and B. D. Greene, Esquires, I owe the unrestricted use of the collections of Lichens in their extensive herbaria; that of the latter gentleman containing many species from Hooker. To Dr. Porter, of Plainfield, who has pursued, for many years, the study of the Cryptogamous Orders, I have been long indebted, not only for several very rare lichens, but for numerous authentic specimens of the more common forms. From other of our Cryptogamists the writer has received interesting species, and particularly from Mr. Russell, of Chelmsford, the author of several excellent papers on these and other allied plants, and our President, George B. Emerson, Esq. To Dr. Harris, in common with every student of Natural History at Cambridge, my obligations have been constant. And I have received from Professor Torrey, Mr. Greene, and Mr. A. White of the British Museum, numerous lichens of New Holland and Van Diemen's Land, some of which are interesting for comparison with our species, with which the former generally seem to agree.

In accordance with the intimation at the beginning of the paper, a few brief remarks on The Syste-

* 127 species, and 4 permanent varieties, have been enumerated and their stations given; of which, 50 were not previously included in the United States Flora. This makes about two-thirds of what the writer has collected and received; and is exclusive of the common species, Lecidea parasema, Lecanora subfusca, Parmelia caperata, &c., which have not been mentioned in his list.

matic Arrangements of the Lichens, together with some Hints on their Uses, from such sources as I have been able to avail myself of, are added.

Linnæus did as much for this, as for every other branch of botany. He arranged the known species, to which he added very many, in natural groups, and of the whole, constituted his genus Lichen. This scheme is so simple, that every botanist in the Linnæan age was acquainted with these plants, and there is hardly one of the excellent Floras of that age, which does not include them. In 1784, the "*Enumeratio Lichenum*" of G. F. Hoffman appeared. This was the first of a series of works, by the same author, which introduced the important changes which have since been made in the systematic arrangement of the lichens. He is the first, so far as I have been able to find, who proposed to erect Linnæus's groups into genera, and he described many species, for which Schærer, Sprengel, and other continental writers have given him credit in their works. Nearly all his writings had appeared before Acharius had published any thing. But Hoffman had soon, in the latter Swedish botanist, a laborious competitor, who before long occupied almost the whole field. The "*Prodromus Lichenographiæ Suecicæ*," of Erik Acharius, was published at Linkioping in Sweden, in 1798, and was the first of the works of this author, who has long been the common authority of lichenists in Great Britain and this country. In the "*Prodromus*," Acharius distributes the Lichenes in three large groups called Families, — the Crustacei,

Foliacei, and Caulescentes. These are subdivided into twenty-two Tribes, to which Tribes substantive names, as of Genera, are given. Still the Linnæan genus Lichen is retained, and each species is named as of this genus, with the addition in each case of a synonym, in which the generic character of the group called a Tribe, is supposed. Thus, Tribe 23, is Cladonia; the first species is Lichen uncialis; the synonym, placed side by side with the vulgar name, is Cladonia uncialis. None of these synonymous names, and none of these Tribes, could be available in their present condition, or until they were regularly set forth in another work. And Acharius always cites his "*Prodromus*," as a Linnæan system, without regard to the improved arrangements, which, as has been shown, were only hinted at in it. Some of the names of these Tribes, he afterwards applied to genera, but others he does not appear to have made further use of. Some of these latter have, however, been adopted in other books, as Physcia, Imbricaria, &c.; which may be found in the French Flora of La Marck and De Candolle, and various works after this standard, but not in later authors. To look a moment at the Tribes of the "*Prodromus*," we find in the Tribe Patellaria, all the lichens which constitute the later genera Lecidea and Lecanora. The former of these names, which is adopted from Hoffman, has priority to those of Acharius, and Hoffman's arrangement is restored by Sprengel, Wallroth, and other later writers, with various modifications. The Tribes Bæomyces and Cladonia, afterwards confounded by Acharius and finally again separated, are here

reckoned distinct, and placed, as by Hooker, far apart from each other. The Cladoniæ are arranged in three Tribes, which, in his subsequent works, Acharius reduced to one genus, Cenomyce; this last arrangement being, however, anticipated by the genus Cladonia of Hoffman. The Gyrophoræ we find constituting the Tribe Umbilicaria, which name also is adopted from Hoffman, and has priority of the former.

The next work of Acharius was the "*Methodus*," which was published at Stockholm, in 1803, and was meant to include all the known species. In this, the ground was firmly taken that the Lichenes ought to be regarded as constituting an Order, rather than a Genus: — "potius Familiam vel Ordinem Cryptogamiæ Classis quam Genus solum constituere." (præm. p. 5.) The necessity of this change is asserted both on the ground of conformity with nature, and also on that of the immense number of species which must be included in the Linnæan genus. The characters of the Genera are taken from those regular and most highly organized parts called apothecia; their position, constitution, and figure being principally regarded. The groups of species are accordant, to a great extent, with those of the Linnæan arrangement, which may be called obviously natural. There are, however, defects incident to the nature of a system, which are also perceptible in that of Acharius; some of the arrangements being probably artificial, and many species appearing to be paradoxical, upon whose right place authors seem never to have been able to agree. It does not require any great attainments in the new method of the

Schools, to perceive the defects of the Systems. These defects may be apparent enough to us, though as yet our knowledge may be limited to the truth which our system has taught us, and we may never have been out to learn of Her who knows nothing of paradoxes and half-truths, who is silent and works without words. I cannot think that the remark of Sir James Smith, himself one of the most illustrious of systematists, — that the arrangements of Acharius "will most likely form the foundation of all that can in future be done on the subject," will not require to be greatly qualified. The arduous labors of the continental lichenists have not been in vain, and that these labors will be of account, in all attempts at reaching the true natural arrangement of the Lichenes, can hardly be doubted. And such works as Sir William Hooker's, on British lichens, though it be still of the school of Acharius, and perhaps suggests more changes than it makes, may well be mentioned in proof of this. Still the "*Methodus*" is a work, which no student of these plants can use without becoming attached to it. The style is simple, and there are places which may even be called Linnæan, and there is very little Greek-Latin. Some of the generic names have been noticed by naturalists for their beauty. And the observations on the species, so much shortened in the succeeding works of our author, abound with matter of usefulness to the lichenist. There are three main divisions of this work, under which the species are arranged in twenty-three genera. The genus Lecidea is separated from the Lecanoræ, which last, with a number

of other groups, afterwards considered to be genera, are united with Parmelia.

The "*Methodus*" was followed, in 1810, by the "*Lichenographia Universalis,*" which was published at Gottingen, in 696 pages, 4to. This great work is remarkable for its minuteness of division. In the introductory dissertation, on the parts and the propagation of lichens, some very important views are proposed, with respect to their fructification, and their carpomorphous organs. The number of species and varieties is greatly augmented in the "*Lichenographia,*" and some new genera constituted, as Lecanora, Ramalina, Borrera, and others. For some further remarks on this work, I would refer to the excellent article "Lichen," in the "Edinburgh Encyclopædia." The last separate work of Acharius is the "Synopsis," which appeared in 1814, 8vo. I have not seen this, but from the citations of other authors, it would seem that several new genera are published in it, and many new species. After the publication of the "Synopsis," our author contributed several Memoirs to the "Transactions of the Royal Society of Stockholm," and particularly one on the genus Calicium, which he distributes in several genera; but these papers are unfortunately written in Swedish.

I have attempted the foregoing view of the writings of Acharius, because they have been so long the manuals of British and American botanists in the study of the Lichenes. This, however, has not been the case generally, on the continent, where many other arrangements have been proposed. Wahlen-

berg's arrangement of the lichens of his Lapland Flora may be regarded as a sketch of a new method. He retains the Linnæan genus Lichen, as one of the genera of the Order. Fries, Eschweiler, Meyer, Agardh, and Chevalier, are mentioned by Hooker, as having proposed new methods. Sprengel has given an admirable arrangement in his "*Systema.*" And Wallroth, a German botanist, is the author of the Cryptogamic part of the German Flora of Bluff and Fingerhuth, in which he has made a new arrangement of the lichens of that Flora. This is apparently a work of great labor, but it is written in a dialect that it requires some study to master, and the terms now and then remind us of the humorous complaint of Professor Schultes, in Sir James Smith's "Correspondence." The class is arranged in three Orders, under which the species are distributed in thirteen genera. In some respects the arrangement resembles that of Sprengel. I will quote this author's curious view of an important part of the Economy of Lichenes: — "*Propagatio* primaria eaque rarior speirematica veluti pseudo-cotyledonaris ex speirematibus sive primitus in cymatiorum rudimenta eblastematica deliquescentibus sive producendo in fila byssoidea nigrescentia radiantia (*hypothema*) excurrentibus periblastesin raro primitus cymatia informantibus secundaria eaque adsueta veluti gemmacea ex hologonidiis emersis fœtis iisque a periblastesi l. sæpius loci injuria deliquescentibus monstraque asyntheta hologonimica et mesogonimica ex globulis microscopicis viviparis crustam pulverulentam effusam nunc viridem nunc flavam versicolorem composita menti-

entibus s. ex his itidem in chraumata s. initia periblastetica sensim abeuntibus." (l. c. p. 286.)

In Great Britain, Hooker, Turner and Borrer, and Greville, have left entire the principal parts of the system of Acharius, upon which they have founded all their arrangement. The part of Sir William Hooker's "British Flora" which includes the lichens, is as valuable to a student of these plants in this country as in England. The arrangement in Natural Families, and the admirable descriptions, principally distinguish this work. The scaly Lecideæ and Lecanoræ of Acharius, are made a distinct family, and constituted as three Genera. Cladonia is also divided into three genera, which form the family Cladonieæ. Borrer, it is said, refers Endocarpon to Verrucaria, and admits Lecanora with difficulty as distinct from Parmelia. But the British lichenists may properly be considered of the school of Acharius, to which also belong those of our own botanists who have illustrated the Lichenes. In the earlier American Floras and Catalogues a few lichens are enumerated. Gronovius describes several, and his list was somewhat enlarged by Forster, and Walter. The last botanist, found, it would seem, Cetraria nivalis, and this was the only authority for the species, as a member of the United States Flora, till its recent discovery on the New England mountains. Twenty-one species, some of which are published as new, are given by Michaux, in his Flora. But the catalogue of Muhlenberg, in his Catal. Pl. Amer. Septent. 1818, which comprises 184 species, 18 of which are given as new, is the first work of impor-

tance that appeared in this country, and though probably it can hardly be otherwise than incomplete, when the extent of the region of country is considered, and certainly is deficient in our New England Alpine lichens, yet I believe no other lichenist has made so large an enumeration, or indicated so many new species. Some of these last are described by Acharius in his "Synopsis," (cited by Halsey,) and of many Sprengel has given descriptions. And they may also be found described in the sixth edition of Eaton's "Manual." Muhlenberg's "Catalogue" was followed in 1819, by that of Professor Torrey, in his "Catalogue of the Plants of New York." In this enumeration, —— species are given, with their common stations. In 1823, Mr. Halsey's very valuable "Synoptical View of the Lichens of New York" was published in the "Annals of the Lyceum." In this work, which must be regarded as the most complete view of the species of a particular district which has been given by any of our writers, more than 170 species are enumerated, 9 of which are given as new. Brief characters are added, and the common stations. Professor Hitchcock's "Catalogue of the Plants of Massachusetts," appended to his "Geological Report," contains 116 species, including a number from Dr. Porter. And the invaluable works of Sir William Hooker, on the "Flora of Boreal America," contain, besides a general survey of the lichens of that region, and descriptions of new species, many remarks illustrative of the economy and the uses of these plants.

But this very imperfect sketch of some of the sys-

tematic arrangements of the Lichenes, which have been proposed by authors, has been extended, perhaps, too far already; and I pass to the next topic, which is suggested by the last clause of the foregoing sentence, — the Uses of the Lichenes. This is an object of far more importance and interest than will readily be supposed by those who have not paid attention to it. But my opportunities of consulting the numerous learned works upon it, have been so very few, that, in the following remarks, I hope only to be able to apply some of the discoveries of European naturalists to our own Flora, as containing the same plants upon which the experiments abroad were made. And I would again refer to the excellent view of this subject in the already-cited article of the "Edinburgh Encyclopædia," of which article I am compelled to avail myself freely, in what follows. The gradual formation of soil, both by the disintegration of the rocks on which many groups of species grow, and also by the decay of their own bodies, has been often traced to the Lichenes. And no botanist can visit one of our old forests, without observing manifest and striking proofs of their slow but sure powers of destruction. This is their destiny, and it requires little thought to understand in some degree its end. But the higher orders of creation have found in these plants uses so important, and man himself has turned them to account so profitably, that perhaps we may not limit the purposes of their being to a simple design, however constant and universal this be found. I have had my room overrun with young spiders, which the warmth brought out

of their winter-quarters in the large Parmeliæ and Stictæ.* And Linnæus says of Cladonia rangiferina, the Rein-deer moss, that "huic Licheni innititur œconomia et salus totius Lapponiæ," — the very existence of Lapland; because, he continues, on this lichen their herds of deer are sustained throughout their whole winter. (Fl. Suec. in loc.) In his Lapland Tour, Linnæus mentions that Cladonia uncialis, and the filamentous lichens, are also used for rein-deer fodder. It is stated that one of the last group, a species of Usnea, has been collected in Virginia for the winter food of sheep and cows. The Rein-deer moss is also stored as provender for black cattle in the North of Europe; and Cetraria Islandica is collected in other countries to fatten cattle.† The rein-deer, which exist in Iceland in a wild state, are also said by Hooker to feed on the Cetraria Islandica, pre ferring, as may be supposed, this lichen to the more abundant but less nourishing Rein-deer moss.

Many lichens have been found edible by man; and the use of Cetraria Islandica is universally known.‡ It is possible that the nutritious part of the Gyrophoræ, various species of which constitute the Rock-Tripe, or "*Tripe de Roche*," of boreal countries, may be very similar to the starchy matter which

* At this season, I have observed with my glass, on many of the tree lichens, very minute Acari, some of them beautiful, and resembling small beetles.

† Encycl. Edinb. l. c.

‡ The species occurs generally, in greater or less abundance, on all our mountains; and it is found more sparingly on hill-sides and in sandy fields throughout New England.

Berzelius found to constitute almost 80 parts in the 100, of Cetraria Islandica. In the latter there is also a bitter extractive matter, said by Linnæus to be purgative, which is removed by boiling; and the account of the use of the Rock-Tripe given in Franklin's voyage,* shows that a great inconvenience found by the voyagers, in preparing these lichens for food, was their inability to remove a similar "bitter principle, nauseous, and producing severe bowel complaints." The species of Gyrophora used by these travellers were GG. Muhlenbergii, Pennsylvanica, hyperborea, and proboscidea β. arctica, all of which are found in New England, and the former, which alone, it seems, is employed by the Indians, (and which, boiled with fish-roe or other animal matter, is "agreeable and nutritious,") very abundantly occurs on the Blue Hills in Milton, and in many other stations given in one of the former of these papers. We are told, however, that they preferred G. vellea, as "more agreeable to eat than any other of the preceding species." † It appears from the above, that in this case, a very considerable difference was found in the species used, two being considered agreeable and nutritious, while the rest not only brought on bowel complaints in some, but, it is further said, if they served to allay the appetite, "were very inefficient in recruiting our strength." Yet an author is cited by Mackenzie in his "Travels in Iceland," p. 423, as saying, that these lichens (the Gyrophoræ), are "longe optimum in re cibaria Lichenis

* p. 173. † And see "Kalm's Travels."

genus,"* which is very high praise. The excellent qualities of the Iceland Moss, Cetraria Islandica, as has been said, are universally known. Proust remarks of this lichen that "Nature can scarcely furnish a more excellent article of food." It is used in the form of flour, of which soup and even bread is made. In Sir William Hooker's "Journal of a Tour in Iceland," I. 133, some account is given of the mode of cooking and using this lichen in that country, where it is more employed than probably in any other. From the same author we learn, that it is also made use of as a dye-stuff. The medicinal virtues of the plant are differently estimated by authors, some of whom appear to doubt their importance; but reference may be had on this point to the learned article "Lichen," by Smith, in Rees's "Cyclopædia." Cetreria nivalis and Gyrophora proboscidea are also eaten in Iceland. The former, which occurs commonly on our highest mountains, is considered, says Hooker, "an extremely agreeable food, and of a sweet taste," and is called by the people Maringraus, in honor of the Virgin. The latter, which, it appears from Mackenzie, is used as food only in times of scarcity, will probably yet be found in our Alpine districts. Parmelia physodes, Sticta pulmonacæ, Ramalina farinacea, have also been reckoned edible lichens, and yield, when boiled, a nearly insipid yellow mucilage, which may be eaten with salt.

As Dye-Stuffs, lichens are very extensively used,

* The author seems to have had Gyrophora *hirsuta* only in his mind, in making this remark; and perhaps in this case, "genus" is to be understood to mean only species.

and several authors have treated the subject at large. I will enumerate a few of our New England species, which in other countries have been found valuable for the purposes of dying. Nearly all the common Parmeliæ; Squamaria Candelaria; Cetraria Islandica and C. juniperina β. pinastri; several Lecanoræ, and especially L. tartarea, which is the "cud bear" of commerce, and of which "whole cargoes" are imported into Britain, and L. Parella, the "perelle" of commerce, and also an article of trade in Europe; several Gyrophoræ; Usnea plicata, and others of the filamentous lichens, may be mentioned. Evernia vulpina is not only employed as a dye-stuff, but it is, according to Pontoppidan, (and a similar account is given in L. Fl. Suec.) very poisonous, and used in Sweden and Norway to kill wolves; which would lead us to suspect some active principle in this lichen worth examining; though I have not found its sensible properties very perceptible to the taste. A slight sensation of burning in the mouth continued, however, for some time after I made the experiment, which, I supposed, was caused by the lichen. This mode of experimenting on the properties of these plants, will be found easy and interesting. The flavor of nearly allied species of the same genus will be found very different, while the same lichens agree nearly in taste with species of other genera differing from them in almost every other respect. A curious remark is quoted from "Weiss Pl. Crypt. Fl. Gott.," in Humboldt's "Fl. Friberg," p. 25, to the effect that the virtues of lichens vary with the trees on which they grow: — "Lichenum enim eædem species, si

diversis arboribus innascuntur, diversum habitum VIRES que sibi assumunt." And another writer has stated that where the same lichens are found growing on rocks as well as trees, the plants from the former are "evidently more productive" of color, than those from the latter. More observations of this kind would be very valuable. And perhaps the remark may be allowed, that chemical analysis might be applied more extensively than it has yet been, to settle the real character of these groups and species, which appear to be reputed as remarkably different in their properties, as they are like in habit. By this means, it is probable, some general results would be obtained and a more complete view of the subject. Sticta pulmonacea, or Oak-lungs, is one of the ancient simples which were employed for the cure of pulmonary complaints. The doctrine of signatures, which found some resemblance in the reticulated thallus of this plant to the figure of the lungs, aided probably in giving the lichen the distinction it acquired; but later experimenters have detected in it "a portion, equal to one eighth of its substance, of a reddish gum, having a slightly bitter taste," which, perhaps, may also in part account for its reputation. Variolaria faginea is now extensively used in France, says Hooker, in the manufacture of oxalic acid. It is further remarked by the same author, that this principle has been found to be common to several other crustaceous lichens; and Braconnot considered the oxalate of lime as bearing "the same relation to the Cryptogamia, as carbonate of lime to corals, and

phosphate of lime to the bony structure of the more perfect animals." *

That these hints may possibly be of use in suggesting further examination of the properties of our lichens, and in making them of somewhat more consequence to investigators, has been my motive in giving them a place. I cannot close this paper without saying how delightful a pursuit for leisure hours the study of the Cryptogamia affords. Perhaps no other branch of botany can be pursued with less expense of time, though none will repay more; or with less of that drudgery which always attends a herbarium. The necessary books are few in number, and for the Lichenes any of the old Linnæan Floras, as Scopoli, Lightfoot, Hudson, will furnish, so far as they go, no contemptible substitute for more modern systems. And such authors as Linnæus himself, and Sir James Smith, leave little, indeed, to be desired. The botanist who engages in this pursuit, finds winter, also, a season of flowers; and the snow cannot hide his tree-lichens, or the inhabitants of the exposed tops of the old fences; and if he keeps in-doors, his wood-pile is rich in species. Another pleasure is added to his walks and to his hours of study, and he attains, through these humble plants, a yet firmer hold on the satisfying charms of Nature.

Χαῖρε· σὲ γὰρ πᾶσι θέμις θνητοῖσι προσαυδᾶν·
ἐκ σοῦ γὰρ γένος ἐσμὲν, ἤχου μίμημα λαχόντες
μοῦνον, ὅσα ζώει τε καὶ ἕρπει θνήτ᾽ ἐπὶ γαῖαν.
Cleanth.

* Br. Fl., II. 169.

ART. XVI. — ATTEMPT TO ASCERTAIN SOME OF THE HEPATIC MOSSES OF MASSACHUSETTS, WITH REMARKS. By JOHN LEWIS RUSSELL; Corresponding Member of the "Boston Society of Natural History," &c. (Read March 17th, 1841.)

IN the year 1821, the Reverend Lewis D. Schweinitz published a small tract, which he entitled a "Specimen of a Systematic Arrangement and Description of the Cryptogamous Plants of North America, comprising a diagnostic description of all the Hepatic Mosses hitherto observed in North America, with ample descriptions of a number of new species." This valuable little work, I have made the guide of what research I have been able to pursue in the study of the plants of my present memoir. Next to this, I know of no other authority, except Muhlenberg's Catalogue, and the Massachusetts' Catalogue, the latter, especially, a mere array of names, until we come to the unrivalled work of Professor Hooker on the Jungermanniæ of Great Britain. On the first and last of these works, I have mainly depended in determining some of the few species of this vicinity, and occasional specimens from other localities generally presented me by friends. It were almost unnecessary to state, that, in the study of these minute plants, often barren (without fructification), errors may have occurred; but great interest in their research and their intrinsic beauty, have prompted me, nevertheless, to exertion. To determine more accurately the exact Flora of

districts, is a work of importance, and to add one's mite to such an end is pleasing and gratifying.

It only remains for me to add that I have for the most part followed Hooker as authority for reducing the species to a systematic arrangement.

JUNGERMANNIA. *Linnæus.*

J. *cordifolia* ? Hooker's Brit. Jung. tab. 32. Growing among a species of Dicranum in bogs, South Pond, Plymouth ! December. Some of the stems furnished with capitula and with white pulverulent granules ; leaves at the tip of the stem, dark purple. Not in fruit.

J. *sphagni*, Dicks. Brit. Jung. t. 33 & Suppl. t. 2. Schweinitz, p. 15. Mass. Catal. Eel River, Plymouth ! Generally adherent to Sphagnum by its long roots from beneath its stem.

J. *bicuspidata*, L. Brit. Jung. t. 11. Dillenius's Musci, t. 70, fig. 13. Schw. p. 17. Found with empty calyces, October, 1839, near Plymouth !

J. *connivens*, Dicks. Brit. Jung. t. 15. Schw. p. 17. near Plymouth ! In mode of growth and texture resembles the last, but is easily distinguished by the curious forcipated teeth of the leaf, — a beautiful species.

J. *Ehrhartiana*, Weber. Schw. p. 17. Plymouth ! Stem very rooting.

J. *nemorosa*, L. Brit. Jung. t. 21. Schw. p. 17. Plymouth ! A somewhat large species of a pale green color, and ciliate-dentate on the edge of the leaves.

J. *complanata*, L. Brit. Jung. t. 81. Dill. Musc. t. 72, fig. 26. Schw. p. 14. Mass. Catal. On mossy rocks, and also on decayed pieces of wood, Chelmsford! A delicate species, closely adhering to the substance on which it grows. Hooker and Schweinitz remark, that its habitat is "the bark of trees." I have generally found it on mossy rocks. Gemmæ may be frequently seen on the edges of the leaves.

J. *bidentata*, L. Brit. Jung. t. 30. Dill. Musc. t. 72, fig. 11. Schw. p. 17. In very moist situations among Hypna near a spring. Chelmsford! If the specimen is examined by the naked eye only, each leaf seems to have three teeth; a deception arising from the overlapping of one leaf on the next. I am inclined to suppose this identical with J. tridentate of the Mass. Catalogue "Schw. Dr. Porter," which, as a species, I can nowhere find described.

J. *trilobata*, L. Brit. Jung. t. 76. Schw. p. 12. Mass. Catal. Among Hypna and other mosses. Chelmsford! Plymouth! From the axilla of the stipules proceed numerous flagellæ, which serve as an excellent guide to distinguish the species. In "Muhlenberg's Catalogue," it is called J. *radicans*, probably on account of this feature.

J. *platyphylla*, L. Brit. Jung. t. 40 & Suppl. t. 3. Schw. p. 9. Mass. Catal. Chelmsford! This is by far the most common species we have, and, owing to its great size, is most observed. Although Schweinitz mentions its habitat as "on the bark of trees, especially Carpinus," yet I have seen it abundant on rocks. Its dark green branching stems are most conspicuous in moist weather, investing the trunks of

almost every kind of tree, and hanging down the sides of large stones in damp situations, and indeed on the flat surfaces of old stone walls. Its range of locality seems extensive, as I have specimens from Ohio and from Maine.

J. *platyphylloidea.* Schw. p. 9. I give this with some hesitation, from a fine large specimen from Sheffield, in the western part of the State. It is certainly much larger than any specimen of J. platyphylla; while the color, yellowish green tinged with brown, inflexed margins of the leaves and stipules, considered essential characters of Schweinitz, seem to point out the species. Unfortunately it is without fruit, which, differing from that of the preceding species, serves as a distinguishing trait.

J. *pulcherrima*, L. Schw. p. 17. This species is considered by Hooker as identical with J. ciliaris; but I concur with Schweinitz that "they are manifestly distinct." My specimens perfectly agree with his description of J. pulcherrima. It truly merits its name, being by far the *most beautiful* of any of our species. Found on Taghannoc mountain, Sheffield, by my friend Mr. Andrew L. Russell.

(Perhaps it may not be amiss to notice that J. sertularioides, M., is quoted in the Mass. Catal. as synonymous with J. ciliaris. This is an error; the two plants being very distinct. I have J. sertularioides from Topsham, Me., and found growing on decayed trunks of trees.)

J. *dilatata.* Brit. Jung. t. 5. (Syn., J. *tamariscifolia*, Schw. p. 10.) Mass. Catal. I have preferred Dr. Hooker's name for this very common species,

which Schweinitz observes to be usually confounded with another of similar appearance. With the other species, I have not yet been so fortunate as to meet. Seen generally on the smooth bark of forest trees, spreading widely with very thin and delicate branches, in a somewhat radiating manner; but when growing on rocks it is more irregular. Chelmsford! and elsewhere!

J. *pinguis*, L. Brit. Jung. t. 46. Schw. p. 19. Mass. Catal. Loudon Encyc. Plants, sp. 15,000. On sides of declivities over which water trickles. Chelmsford! In fruit, March. Also at Plymouth, South Pond!

J. *multifida*, L. Brit. Jung. t. 45. Schw. p. 20. Mass. Catal. Allied to the preceding, but distinct, having reticulated and narrow fronds. Plymouth!

ART. XVII. — DESCRIPTIONS OF THE FISHES OF THE OHIO RIVER AND ITS TRIBUTARIES. By JARED P. KIRTLAND, Professor of the Theory and Practice of Medicine in the Medical College of Ohio, at Cincinnati. (Continued from page 352.)

POMOTIS. CUV.

P. *macrochira*. Raf. The Gilded Sun-Fish.

Ichthelis macrochira. Raf. Ichth. Ohien. p. 27.

Plate XXVII. Fig. 3.

Head scaleless between the eyes. Scales of the operculum larger than those of the other parts of the head. *Mouth* small. *Operculum* terminates behind

in a semi-circular elongation, which is black and submargined with a lighter colored border.

Body somewhat compressed, especially near the back; uniformly oval.

Dorsal and *anal* fins inserted on fleshy, slightly extended bases, with minute scales extending upon a portion of the membranes of their soft rays. *Caudal fin* slightly bilobed; lobes equal, their bases furnished with scales between the rays for one fourth of their length. *Ventral fins* horizontal, reaching beyond the vent, to the commencement of the anal fin. *Pectoral fins* thin, diaphanous, extending as far as the tip of the ventrals.

Color. Back and head iridescent, brown and purple, blotched with spots of darker brown; throat, sides, and belly a brilliant golden yellow. *Iris* gilt-brown. *Pectoral fins* fuscous or light brown; the other fins pale olive.

Length from 2 to 8 inches.

D. 10 – 12; C. 17; A. 3 – 10; V. 1 – 5; P. 15.

Habitat. Tributaries of the Ohio in the vicinity of Cincinnati, particularly the Bank Lick.

Observations. This is a well-marked and distinct species, at once recognised by its color, the smallness of the mouth, and length of the pectoral fin, as well as the shape and color of the posterior extremity of the operculum.

P. *vulgaris*. Cuv. The Sun-Fish. Roach. Harlequin Roach.

Pomotis vulgaris. Cuv. et Valenc. Hist. Nat. des Poissons. t. III. p. 91. pl. 49.

Pomotis vulgaris. Cuv. et Valenc. Hist. Nat. des Poissons. t. VII. p. 465.
" " Richardson. Fauna Boreali-Amer. p. 24. fig. 76.
" " Storer. Report on the Fishes of Massachusetts. p. 11.
" " Kirtland. Report on the Zoology of Ohio. p. 191.
Labrus auritus. Linnæus. Systema Naturæ. Turton's Translation. Vol. I. p. 794.
" " Shaw. General Zoology. Vol. IV. p. 482.
" " Mitchell. Transactions of Lit. et Philosoph. Soc. N. Y. Vol. I. p. 403.
Ichthelis aurita. Rafinesque. Ichthylogia Ohiensis. p. 29.

Plate XXVIII. Fig. 2.

Head short, obtuse; cheeks prominent. *Eyes* large; *iris* golden, but soon changes to black after the fish is taken. *Lower lip* projecting. *Jaws* set with fine teeth. Operculum terminates in a black, flexible appendage, tipped with vermilion on its lower edge, and with blue above.

Body compressed, back thinner than the abdomen.

Anterior dorsal fin less elevated than the posterior.

Pectoral fin extends beyond the commencement of the anal.

Length 6 inches.

D. 10 – 11; P. 15; V. 1 – 5; A. 3 – 10; C. 22.

Color. Caudal and dorsal fins spotted and barred with black and verditer. *Back* deep olive and black, sides undulated with blue, dotted with fuscous or orange and olive. Belly yellow, gilt, or bronzed. Head bronzed and barred with blue.

Hab. Cleveland harbour, and bayous of the Cuyahoga.

Observations. In most particulars it agrees with Dr. Mitchell's description of the *Labrus auritus* of

New York. The pectoral and ventral fins in the western fish are not yellowish as in those of New York; but I still believe them to be specifically identical. It does not agree in the number of rays in the anal fin, nor the color of the membranous appendage with that described under the same name by Rafinesque; but there is considerable variation in the specimens from different localities.

P. *nitida*. Kirtland. The Sun-Fish. Red eyes.

Plate XXVIII. Fig. 1.

Head short, abrupt. *Eyes* full, vermilion-colored. *Jaws* set with numerous small teeth. *Operculum* oval, appendage large, black, edged with vermilion except at its superior and anterior edge, which is bluish white.

Body compressed, oval. *Back* gibbous between the eyes and dorsal fin. *Vent* post-medial. *Lateral line* much curved upwards above the appendage of the operculum.

Dorsal fin double: spinous rays 10, less elevated than the soft rays which are 11 in number. The interstitial membrane is fuscous or ochery-yellow, sometimes flesh-colored, edged with verditer blue.

Pectoral fins translucent, about 12-rayed, colorless, extending nearly as far back as the vent.

Ventral fins having 1 spinous and 5 soft rays, with a decurrect membrane uniting it to the abdomen; the tip reaches the vent, the rays bluish, lined with minute black pencillings, interstitial membrane black.

Anal fin with 2 spinous and 9 soft rays, nearly reaches the base of the caudal; color, the same as the dorsal, but more bright and orange.

Caudal fin 18 rayed; bilobed; color, the same as the dorsal.

Color, brilliant, but evanescent, and fading as soon as the fish is taken out of the water. Upper part of the head and back brown, yellowish, and sometimes greenish. Head, jaws, operculum, and sides beautifully waved and spotted with verditer blue. Lips light blue, sides golden yellow, belly tinged with orange.

Length, not exceeding 3 inches.

Hab. Mahoning river.

Observations. I cannot apply the description of any of Rafinesque's species to this fish; nor does either of the seven species of Pomotis, described by Valenciennes in the seventh volume of his *Hist. Nat. des Poissons*, agree with its characteristics. I do not, therefore, hesitate to consider it an undescribed species. Its habits are peculiar, and its markings prominent. The preceding species always seeks still sluggish water for its resort; this species always makes its bed on the margin of the clearest running streams, on a pebbly bottom. The size, also, will distinguish the two.

Ammocœtes. Dumer.

A. *concolor*. Kirtland. The Mud-Eel. Blind-Eel.

Plate XXVII. Fig. 1.

Head declivous, convex above the branchial open-

ings; *mouth* semi-circular, elongate; *lower lip* transverse; *nose* terminates in a short snout, projecting over the mouth; *eyes* scarcely discernible; *branchial* openings seven, arranged in a horizontal sulcation.

Body sub-cylindric, more compressed laterally behind the vent; transversely marked, with numerous curved sulcations along the whole extent of the body.

Dorsal fin commences narrow, over the middle of the body, expands to its greatest width over the vent, then declines towards the posterior extremity, but is continuous around the tip of the tail, again expanding as it approaches the vent, and is widest one third of the distance from that orifice. By this arrangement the dorsal, caudal, and anal fins are united in one continuous extension.

Color. The back and sides are uniformly of a light olive, or sometimes a leaden hue; the belly and throat of a yellowish white; the fins pale and diaphanous. Irregular series of dark brown dots are imprinted on the whole length of the sides of the body and more faintly above the branchial openings.

Length 4 or 5 inches. *Breadth* at the commencement of the dorsal fin ⅜ of an inch.

Hab. Mahoning and Scioto rivers.

Observations. I first obtained half a dozen specimens from a pit sunk in the bank of the Mahoning river, for the purpose of erecting an abutment to a bridge. At the same time were taken several of the Menopoma and Menobranchus. Subsequently, my friend Joseph Sullivant, Esq., of Columbus, has furnished me with other specimens taken in the vicin-

ity of that city; from the latter the drawing was made.

This species cannot be the A. *bicolor* of Lesueur, for he describes that species as having the "*dorsal fins low, separated, the second united with the caudal, which is rounded; back and sides reddish,*" &c. I have in my possession the figure of this species, drawn, engraved, and colored by that author; and the characters are so distinctly different from the specimens before me, that I believe I am warranted in describing the latter as a new species.

Fig. *a.* Full size.
Fig. *b.* View of the Mouth.

Pimephales. Raf.

P. *promelas.* Raf. The Black-headed Flat-head.

Pimephales promelas. Rafinesque. Ichthyologia Ohiensis. p. 53.
" " Kirtland. Rep. on Zool. of Ohio. p. 194.

Plate XXVII. Fig. 2.

Head globose. *Snout* sloping, broad, truncate, with soft warts in front. *Mouth* small, elliptical, transversal, with equal circular hard lips. *Eyes* round. *Irides* dusky.

Body full, gibbous on the back, anterior to the dorsal fin; somewhat compressed on the sides. Lateral line flexuous at its base. *Scales* rather large.

Dorsal fin with the anterior ray sub-spinous, stiff, elevated, half the length of the soft rays, and the posterior soft ray equal to the longest.

Caudal fin lunated; the divisions acuminate and incurved at their tips.

Anal fin rhomboidal.

Ventral fin horizontal and extending to the middle of the base of the Anal.

Pectoral fins ovate, do not attain to the bases of the dorsal or the ventral.

Color. The whole head of a bluish black. *Back* dusky, *sides* and abdomen of an olive or sometimes coppery yellow; fins olivaceous; the dorsal blotched at the base of the rays with jet black.

Length 3 inches. *Diameter* $\frac{6}{8}$ of an inch.

D. 1–8; C. 20; A. 8; V. 7; P. 15.

Hab. The tributaries of the Mahoning river.

Observations. I consider myself as extremely fortunate in being able to lay before the public a correct drawing of this rare fish. Rafinesque made out his description of it from a solitary specimen taken in a pond near Lexington, Ky. During the last summer, I succeeded in taking three, by means of a small net, in a *spring-run* on my farm, in the township of Boardman, Trumbull County, and also had repeated opportunities to watch their peculiar habits. They had formed beds or slight excavations under the ends of logs and stones, in still water, and were actively engaged in defending their premises against the approach of other fishes. This habit first led me to distinguish them from the common chubs which abound in the same locality. The hard, cartilaginous lips, the character of the first ray of the dorsal fin, the peculiar, globose form of the head, as well as their habits, will at once distinguish them

from any other of our fishes, and perhaps these characters warrant Mr. Rafinesque in setting them apart as a new genus, characterized by the "Body oblong, thick, and scaly. Vent posterior, nearer to the tail. Head scaleless, fleshy all over, even over the gill covers, rounded, convex above and short. Mouth terminal, small, toothless, with hard cartilaginous lips. Opercule double, three branchial rays. Nostrils simple. Dorsal fin opposite the abdominals, with the first ray simple and cartilaginous. Abdominal fins with eight rays."

Coregonus. Cuv.

C. *albus*. Le Sueur. The White-Fish of the Lakes.

Coregonus albus. Le Sueur. Journal of the Academy of Natural Sciences. Vol. I. p. 232.
" " Richardson. Fauna Boreali-Americana. Fishes. p. 195 et fig.
" " Kirtland. Report on the Zoology of Ohio. p. 195.

Plate XXVIII. Fig. 3.

Head triangular, compressed, smooth; *gill covers* diaphanous; *maxillaries* wide, and when the mouth is expanding, playing upon their attachment above to the vomer; *eyes* brilliant; *pupils* black; *irides* silvery; *upper jaw* longer than the lower; tip of the nose slightly recurved and obtuse.

Body compressed laterally; form varying from age, sex, and condition; slightly gibbous behind the head; rectilinear between the dorsal and adipose fins.

Dorsal and *anal* fins, quadrangular.

Adipose fin small, situated above the anal.

Caudal fin deeply and acutely bilobed.

Abdominal and *pectoral* fins falcate and elongate.

Color. Back steel-gray, iridescent; sides silvery; abdomen white. *Caudal* and *anal* fins reddish and dusky.

Length 20 to 25 inches.

D. 14; P. 14; V. 11; A. 14; C. 20.

Hab. Lake Erie and the Upper Lakes.

Observations. A few specimens are occasionally taken at Cleveland and at other places on the shores of Lake Erie, but they are most abundant and attain the greatest size and perfection in some of the Upper Lakes, where the business of taking and preserving them gives employment to many persons during certain seasons of the year. They are esteemed as the most valuable of the western fishes. They are distinguished from the Coregonus Artedi by their greater size, their color, and the flattened form of their bodies.

The stomach is small, with thick mucous and muscular coats; the length of the intestinal canal, including the œsophagus, stomach, and intestines, does not exceed the total length of the fish. One half of the contents of the abdomen seems to consist of numerous cœca. I have never been able to detect any substance within their stomachs except a quantity of decayed wood, thickened mucus, and the apparently comminuted seeds of a polygonum. The stomachs of the C. Artedi usually contain numerous small fishes. The jaws of the white-fish are edentulate. Le Sueur's figure in the "Journal of the Academy

of Natural Sciences," Vol. I., is essentially correct, except in the form of the head and nose, which he has but badly represented.

Amia. Lin.

C. *calva*. L. The Dog-Fish of Lake Erie.

Amia calva. Turton's Linnæus. Vol. I. p. 838.
" " Shaw's General Zoology. Vol. V. p. 9.
" " Cuv. Griffith's Translation. Vol. X. p. 447.
Amia ocellicauda. Richardson. Fauna Boreali-Americana. p. 236.

Plate XXIX. Fig. 1.

Head cylindric-conical, rather abrupt anteriorly, solid, rugose ; *sutures* prominent ; upper jaw slightly projecting. *Nostrils* small, circular, a cirrus before each. *Jaws* margined with strong, prominent, flattish teeth, armed within with numerous erect smaller teeth, which also cover the palate. *Eyes* small, circular.

Body cylindrical anteriorly, compressed towards the caudal fin. *Scales* subcircular, flat, depressed somewhat in their centres. *Medial line* slightly curved.

Color. Back of head bluish black ; sides obscurely maculated in some specimens with olive spots ; under surface white.

The *base of the caudal fin* oblique ; a black spot at its upper edge.

Length from 18 inches to 2 feet.

D. 48 ; P. 17 ; V. 6 ; A. 9 ; C. 22.

Hab. Lake Erie.

Observations. The upper part of the pharynx is armed with two elongated bony plates; which are adapted to the bony armature of the branchial rays in such a manner as to enable the fish to grind to pieces its food. The alimentary canal from the pharynx to the vent does not exceed the whole length of the fish itself. Its natatory bladder is cellular, like the lung of a reptile. In the stomach of one I dissected, were found the remains of a number of craw-fish. Richardson, in the "*Fauna Boreali-Americana*," describes a species taken in Lake Huron, which he calls A. *ocellicauda*. This northern species I believe to be specifically identical with the A. *calva*, as his description agrees with the description of that fish; and I have traced its residence in all the waters from Lake Erie, south to the Mississippi, and thence to the waters of South Carolina, whence Linnæus obtained his specimen.

Centrarchus. Cuv.

C. *hexacanthus*. Valenciennes. The Rock-Fish. Grass-Bass.

Cantrarchus hexacanthus. Valenc. Hist. Nat. des Poissons. t. 7. p. 456. pl. 48.
Cantharus nigro-maculatus. Le Sueur. Hist. Nat. des Poissons. t. 111. p. 88.
Cichla Storeria. Kirtland. Rep. on the Zool. of Ohio. p. 191.

Plate XXIX. Fig. 2.

Head small, depressed between the eyes, compressed laterally. *Jaws* armed on their edges with a

row of minute teeth ; *lower jaw* the longer, projecting. *Operculum* and *preoperculum* scaly, the latter serrated on the posterior angle and lower edge. *Irides* golden yellow.

Body flattened on its sides ; *back* very little thicker than the abdomen, gibbous before the dorsal fins, especially in the older specimens. *Lateral line* following the curvature of the back.

Dorsal fin prominent ; the first spinous ray short, the two last equal, but not equal to the longest of the soft rays.

Pectoral fins delicate, pellucid, extending beyond the abdominal, to the commencement of the dorsal and anal.

Ventral fins reaching beyond the commencement of the anal ; their last soft ray connected at its top with the abdomen by a reflected membrane.

Anal fin prominent, extending backwards beyond the dorsal.

Caudal fin large, bilobed or lunated.

Color. Forehead and back maculated and variegated with dusky spots on a ground of sea-green ; similar spots extend downwards upon the upper half of the body, in irregular bands, on a ground color of light green or yellow ; sides of the head and body silvery and iridescent ; below of a delicate white. Dorsal, anal, and caudal fins barred with series of irregular dusky spots, more distinct in old than in young specimens. Pectoral and ventral fins ferruginous or yellowish.

Length 6 to 12 inches.

D. 6 – 15 ; P. 12 ; V. 1 – 6 ; A. 6 – 19 ; C. $17\frac{2}{2}$.

Hab. Bayous of the Cuyahoga, and the Big Miami rivers.

Observation. The number of rays in the different fins varies with age; but whether they become uniform in old specimens, I have not had sufficient opportunity to determine. I made the annexed drawing from one eight inches in length, obtained in the Cincinnati market, and the rays were counted with accuracy.

In my "Report on the Zoology of Ohio," I included it under the name *Cichla Storeria*, supposing it to be an undescribed species. Dr. Storer has since informed me that Cuvier had previously described it in the third volume of his "*Histoire Naturelle des Poissons*," from specimens taken by Le Sueur in the River Wabash, and sent to him under the name of *Cantharus nigro-maculatus.* It was supposed, at the time it was described, to be identical with the *Labrus sparoides*, Lacépède; and, consequently, in the volume referred to, it is called *Centrarchus sparoides.* Subsequently, Valenciennes, in the seventh volume of the "*Histoire Naturelle des Poissons*," applied the specific name of *hexacanthus.*

This species is esteemed as a valuable pan-fish by epicures. It is known in the market of Cincinnati by the name of the *Bank Lick Bass*, being taken in the Bank Lick run, five miles from the city in the State of Kentucky. At Cleveland, it is called the *Grass Bass* from the circumstance that it usually harbours among the weeds and grass that spring up in the shoal waters of the old channel of the Cuyahoga river. In other places it is called *Rock Bass.* It bites readily at a baited hook.

ART. XVIII. — RESULTS OF AN EXAMINATION OF THE SHELLS OF MASSACHUSETTS, AND THEIR GEOGRAPHICAL DISTRIBUTION. By Augustus A. Gould, M. D. (Read February 3d, 1841.)

Since the commencement of the various geological surveys of the several States, which began with Massachusetts, under a legislative resolve dated June 5th, 1830, and which have since been ordered by almost every State in the Union, Natural Science may be said to have received its first permanent footing in America. A new order of men has been called into action, who have been recognised, and in some measure patronized, by legislative enactments. It is now no longer a species of outlawry to be regarded as a Naturalist; and the consequence will be, that, instead of the few, who, in spite of circumstances, have become proficient in Natural History, there will henceforth be many, who will obtain an honorable place among scientific men, such as the nations of the old world delight to honor.

From the manner in which the surveys, above alluded to, have been carried on, each State providing for its own territorial limits, one peculiar advantage will arise. We shall have not only a careful enumeration and examination of the animals of all the United States, much more than would be likely to result from the labors of any body of men appointed by national authority, but we shall pretty accurately find the geographical limits of every species.

Having been appointed, as one of the Commissioners for the Zoological Survey of Massachusetts, to

examine the invertebrate animals, with the exception of insects, it is my purpose, in this paper, to give some notices of the history of conchology in this State, and the results of my observations on the geographical distribution of the shells within its limits.

The extensive commercial adventures which have been so long carried on from Massachusetts with China, the Northwest Coast, and the West Indies, and more especially the whale-fisheries, have given the principal sea-ports advantages for making collections of foreign shells, which have not been enjoyed by other larger cities. The collection in the Museum of the "East India Marine Society," at Salem, was the fruit of this foreign trade. It is of considerable extent and much notoriety, but it was made as a matter of curiosity, rather than for scientific purposes. It afforded materials for study to its Curator, Dr. Seth Bass, by whom it was scientifically arranged, at the same time that he began to collect a private cabinet, which is now one of the richest in New England.

The "Linnæan Society," which flourished about twenty-five years since, also made a considerable collection of shells. The principal, if not the only conchologist in that society, was the Hon. Francis C. Gray.

Dr. T. Wm. Harris collected shells with other objects of natural history; and Dr. D. H. Storer began early to gather the shells along the coast of Maine and Massachusetts; and to these two gentlemen Mr. Say was indebted for most of the shells of this region, which he described. In addition to

these, the following persons may be mentioned, as constituting nearly the whole corps of conchologists in Massachusetts, previous to the year 1830. The late Dr. John Dixwell and Simon E. Greene, Esq., of Boston, Dr. Swift and Mrs. Barnard of Nantucket, Thomas A. Greene, Esq., and Mrs. Coffin of New Bedford, Mr. J. M. Earle of Worcester, Dr. L. M. Yale of Holmes's Hole, and Amos Binney, Esq., of Boston, whose collection was, at that time, superior to all the others, comprising nearly 2000 species, and formed, by his donation, the basis of the collection of the Boston Society of Natural History. Since that time, the number of those who have engaged in the study of conchology has rapidly increased.

By a resolve of the legislature, dated February 2, 1831, the geological surveyor was directed to cause a list of the zoological productions of the State to be appended to his Report then in preparation, and which was printed in March, 1832. Previous to this, no attempt had been made to give the Fauna of the State, and there was no one person, who could have told, with any tolerable degree of accuracy, the native animals of Massachusetts. Lists of the shells were furnished for this Report, by Col. J. G. Totten, then residing at Newport, R. I., T. A. Greene, Esq., of New Bedford, and Mr. J. M. Earle of Worcester, who had given special attention to the conchology of the interior of the State. Their united Catalogues gave, in all, 126 species.

When the second edition of the "Geological Report" was about to be printed, in 1835, a committee of the Boston Society of Natural History under-

took to prepare the list of shells. This was done with much labor and care; the number of species was augmented to 165, and many important corrections were made in the nomenclature of the preceding catalogue.

A still further resolve in June, 1837, for the continuation of the geological and zoological survey of the State, by which the different departments were allotted to distinct Commissioners, gave opportunity for a still more accurate determination and enumeration of our Fauna. In conchology, the explorations of Doctors Storer, Yale, Bass, Forsyth, and Prescott, and Messrs. Binney, Couthouy, Adams, Whittemore, Greene, Tuckerman, and Col. Totten, had afforded materials for rendering our list of shells much more extensive and complete than it could previously have been. The Report on the Mollusca, Crustacea, and Radiata, is just now from the press, and affords the following results, as to the testaceous Mollusca.

The whole number of species is 274; which is an addition of 100 to the list of 1835, and of 148 to that of 1832, or more than doubling the number. Of these there belong to the class Annelida 6 species; to Cirripedes 12; Conchifera 97; Brachiopoda 2; Gasteropoda 154. Twenty-nine species belong to the land, 42 to fresh water, and 203 are marine. With these we might mention nine species of naked Mollusca, two of which are terrestrial, and seven marine. Several genera, not previously observed, have been discovered. Such are Panopæa, Anatina, Thracia, Osteodesma, Montacuta, Kellia, Lucina, Terebratula, Dentalium, Cemoria, Bulimus, Siga-

retus, Tornatella, Skenea, Janthina, Turritella, Scalaria, Odostomia, Cancellaria, Pleurotoma, Rostellaria, and Trichotropis. The number of species added to some of the genera is remarkable. Thus, there have been added to Nucula 6, to Chiton 5, to Bulla 6, to Margarita 4, to Cerithium 4, and to Pleurotoma 3 species. Seventy species have been discovered and described as new, within the last five years; while, on the other hand, more than twenty species which had been described as new, by different writers, have been proved to be well known, and previously described, on the other side of the Atlantic.

They are distributed under the following genera, namely; Pectinaria 1, Spirorbis 3, Serpula 1, Coronula 1, Balanus 6, Anatifa 3, Cineras 1, Otion 1, Teredo 1, Pholas 2, Solen 1, Solecurtus 2, Machæra 2, Solemya 2, Panopæa 1, Glycymeris 1, Mya 2, Corbula 1, Pandora 1, Osteodesma 1, Anatina 1, Cochlodesma 1, Thracia 1, Mactra 3, Cumingia 1, Mesodesma 2, Montacuta 1, Kellia 1, Saxicava 1, Petricola 2, Sanguinolaria 2, Tellina 2, Lucina 3, Cyclas 4, Astarte 5, Cyprina 1, Cytherea 1, Venus 4, Cardium 4, Cardita 1, Arca 2, Nucula 8, Unio 5, Alasmodon 3, Anodon 3, Mytilus 2, Modiola 7, Pecten 3, Ostræa 2, Anomia, 2, Terebratula 2, Chiton 6, Patella 1, Lottia 2, Dentalium 1, Cemoria 1, Crepidula 4, Bulla 9, Helix 16, Pupa 7, Bulimus 1, Succinea 3, Auricula 2, Planorbis 11, Physa 3, Limnæa 6, Ancylus 2, Valvata 2, Paludina 1, Amnicola 1, Natica 8, Janthina 1, Velutina 2, Sigaretus 1, Tornatella 1, Vermetus 1, Skenea 1, Scalaria 4, Margarita 5, Littorina 3, La-

cuna 2, Cingula 2, Turritella 2, Pyramis 1, Odostomia 5, Cerithium 5, Pleurotoma 3, Cancellaria 1, Fusus 10, Pyrula 2, Ranella 1, Rostellaria 1, Trichotropis 1, Purpura 1, Buccinum 9, Columbella 1, Spirula 1.

At least seventy of our marine species are also found on the transatlantic shores, and a few terrestrial species are also found on both continents. Of these last may be mentioned *Helix aspersa*, *hortensis*, *cellaria*, *pulchella*, perhaps *lucida*, and *Bulimus lubricus.* There are several other shells which, if not the same, are very closely allied ; such as *Succinea*, and some of the species of *Limnæa* and *Planorbis.* Mr. Forbes, in his Report to the British Association, in 1839, puts down *Limnæa palustris* and *stagnalis*, as American species, alluding probably to our L. *appressa* and L. *elodes.* I will not pretend to dispute this, because their similarity is great, and it would be very difficult to prove them either identical or distinct. It appears to me that they present differences which are at once perceived, if they cannot be plainly described, so that any one might readily separate them from each other.

It is not difficult to account for the transportation and subsequent propagation of the terrestrial species from one continent or island to another. This is well known to be the case in England, and Mr. Forbes, in the report above referred to, gives numerous examples of it, and in some instances gives us the historical period and manner of the transfer. This, we know, is the history of *Helix aspersa*, *hortensis*, and *cellaria* in this country,—shells which

commerce has introduced and which have not yet travelled away from the sea-shore. *Helix variabilis* and *pisana*, and *Bulimus acutus*, however, which Mr. Forbes also sets down as introduced to this continent, have not yet been found, so far as I am able to learn, while he does not mention *Bulimus decollatus*, which is not infrequent in South Carolina and Georgia. *Alasmodon margaritifera* and *A. arcuata*, are also regarded by many as identical. But all the specimens of the former which I have had an opportunity to examine, differ very essentially from any specimens of our shell which I have ever seen. Indeed, I am not yet satisfied that any fresh water mollusk is common to both sides of the Atlantic. Animals living on territories widely separated by salt water, are always found to be different, unless the means of intercommunication are obvious, or at least possible. They appear to have been created distinct, and ever to remain so, unless mingled by design or accidental transfer.

About twenty of the larger species may be regarded as intermediate between the two continents, as they are most abundantly found about Newfoundland and the Grand Banks, where they are an abundant source of food to the fish which are caught there.

Several other species have been found in other States on the immediate borders of this State, which will, undoubtedly, be found within its limits ere long.

The geographical distribution of shells is a subject which is daily gaining additional interest, and assum-

ing a more and more practical aspect. It is pursued with a view to ascertain the value which fossil conchology may have in determining the age and nature of geological formations. Various causes are found to modify the distribution of shells, such as latitude, altitude, inclination of the surface, the character of the rocks, &c. On limestone formations snails are usually abundant, while they are rarely found in granite regions. The Limnæa is most abundant in the streams of colder regions, and Melania takes its place in warmer climates.

The geological structure of this State, and its limited territory, furnish little room for variety from these causes; yet a few peculiarities in distribution may be noticed even here. *Helix hortensis* is as yet confined to some limited parts of the sea-coast, as the extremities of Cape Ann and Cape Cod; while H. *tridentata*, *hirsuta*, and *monodon*, are only found in the interior and western portions of the State. Of the fresh water mussels, we find *Unio complanatus*, *radiatus*, and probably *nasutus*, in every region. U. *cariosus* is only found in the Connecticut and its tributaries, and in ponds in Plymouth. *Anodon implicata* is perhaps entirely limited, in this State, to ponds in Essex and Middlesex counties; and A. *undulata* to the Blackstone and its tributaries. The region of the sea is said to favor the developement of some species of land shells; and special mention is made of *Bulimus lubricus*. If I may judge from a single observation, this remark will hold good with us. I have seen the fallen leaves all over Oak Island, a small wooded spot in the vicinity of Chelsea Beach,

so covered with this shell, that from twenty to one hundred might be taken up on a single leaf. I have observed it in only a few other situations, where it occurs solitary.

The distribution of the marine shells is more worthy of notice. There is a peculiarity in the topography of Massachusetts, which causes as remarkable a modification in the distribution of the Mollusca as can be anywhere shown within the same limits. I refer to what is well called the right arm of our Commonwealth, Cape Cod. This neck of land, which stretches out into the sea, in a curved direction, a distance of some forty or fifty miles, and is nowhere more than about twenty miles wide, has hitherto proved an efficient barrier to the migration of many genera and species. Many whole genera do not pass from one side to the other of this limit. Thus, no species of Panopæa, Glycymeris, Cyprina, Terebratula, Cemoria, Cancellaria, Rostellaria, or Trichotropis has yet been found to the south of the extreme point of Cape Cod; while Corbula, Cochlodesma, Cumingia, Montacuta, Tornatella, Cerithium, Ranella, and Pyrula do not pass to the north of it. Of the 203 marine species, 81 do not pass to the south, and 30 have not been found to the north of the Cape, though many of them approach within a very few miles of each other. The remaining 92 species take a wider range, and are found on both sides. It is probable that future observations will reduce the number of the limited species somewhat, but still the numbers will be so large as to exhibit a most remarkable limitation.

Massachusetts may almost be said to be destitute of fossil shells. None have been found which do not also exist in a recent state in the immediate vicinity. It is true that at Gay Head, Martha's Vineyard, the most fertile locality for fossil remains in the State, they are found at an elevation of many feet above the ocean; and they are also found buried many feet below the diluvial sands of Nantucket, and its neighbourhood. Still, they are the recent shells of the vicinity, hardly yet fossilized, few in number, and seeming to have been buried at no very distant period. In the interior, we find in the sediment of ponds, especially those in the neighbourhood of Pittsfield, myriads of the species of Planorbis, Limnæa, Physa, and Cyclas now living in the same waters, which are forming beds of marl there. In the vicinity of New Bedford, Professor Adams discovered a bed of the shells of *Pholas costata*, a species which is now extinct here, and is not found living within 12 or 1500 miles. Yet, from the various ages of the specimens and their integrity in their most delicate portions, it is evident that they once lived where they are now found, and that they have, from some cause, become entirely extinct. This is not the only instance of a similar catastrophe. It is well attested, that native oysters were abundant within the extremity of Cape Cod, previous to about the year 1780, when they were entirely destroyed; and immense beds of shells still remain to attest the fact. It is said that the cause of their death was what is called a ground frost, that is, a degree of cold so great as to coat the bed of the sea, where the oys-

ters lay, with ice, thus cutting off from them the power of respiration. This is especially evident at Wellfleet, the town whence the Boston market is now chiefly supplied with oysters, but all of which are first transported and planted there from more southern waters.

Another curious fact which may be interesting to the geologist, has been observed at Lowell. In digging away a sand-bank, not far above the junction of the Concord and Merrimack rivers, which has not been known to undergo any alteration within the memory of man, there were found, at some 30 feet below the surface, some vegetable and animal remains. They consisted of the branches, leaves, cones, and acorns of pines and oaks, in a state of perfect preservation, and of Unios, apparently perfect. But on examination, the earthy matter was found to have entirely disappeared, nothing remaining but the epidermis, which was so entire in its minutest details, that the species were as readily made out, as if just from the water.

I will mention only one other fact, which may serve to illustrate, how accident, design, or some convulsion of nature may present us fossils in the immediate vicinity of living animals of the same species. The Western Avenue, or Mill Dam, was built from Boston across a broad basin to the westward of the city, by which the water is excluded from the region between Boston and Roxbury. It is now more than twenty years since this was done, and much of the land has already been built upon. Throughout this whole region, there is a stratum of shells, such as inhabit the river on the other side of the Mill Dam,

about four or five inches below the surface. This may demonstrate to us what has happened in the fossil rocks of other ages, and what will be present to the geologist who may live when the present soils become condensed into solid rocks.

Experience has shown, that, in order to construct a tolerably complete catalogue of the shells of any region, it is necessary that observations should be extended through a series of years. It has been found, that species, which, in one season, appear in great abundance, are not seen again for several years, or but very sparingly. In the spring of 1838, *Osteodesma hyalina* was strewed upon Chelsea Beach in great numbers, and of very large size. It had never been observed there before, and has scarcely been seen there since. *Cyprina Islandica*, *Solemya velum*, *Venus gemma*, and *Margarita arctica* also present instances of similar periodicity at long intervals. In the summer of 1840, large numbers of *Janthina fragilis* were found upon the shores of Nantucket; and this is the only occasion on which I have known of its appearance upon our coast. During the winter of 1838 – 9, that remarkable shell, *Nucula thraciaformis*, was frequently found in the stomachs of the *sand-dab* (*Pleuronectes dentata*); but the search for them since has been almost fruitless. These fish were taken off Race Point, the extremity of Cape Cod, and this is the only locality where the shell has yet been found. Many similar instances might be mentioned. Hence, in addition to the remark made above, it may also be suggested, that it is always best to lay in a good store of any species, while we may.

CONSTITUTION AND BY-LAWS

OF THE

BOSTON SOCIETY OF NATURAL HISTORY.

CONSTITUTION.

ARTICLE I.

The Society shall be called the Boston Society of Natural History.

ARTICLE II.

It shall consist of Members, Corresponding and Honorary Members, and Patrons.

ARTICLE III.

Members shall be chosen by ballot, after having been nominated at the meeting immediately preceding that on which the ballot is taken: the affirmative votes of *three fourths* of the members present shall be necessary to a choice. Corresponding and Honorary members shall be elected in a similar manner, but *their* nomination shall proceed from the Council. Any person who shall contribute at one time, to the funds of the Society, a sum not less than fifty dollars, shall be a Patron.

ARTICLE IV.

Members only shall be entitled to vote, to hold office, or to transact business: Corresponding and Honorary Mem-

bers and Patrons, may attend the meetings, and take part in the scientific discussions of the Society.

ARTICLE V.

The officers of the Society, shall be a President; two Vice-Presidents, first and second; a Corresponding Secretary; a Recording Secretary and Clerk; a Treasurer; a Librarian; eight Curators, and a Cabinet Keeper, — who, together, shall form a Board, for the management of the concerns of the institution, and be called the Council.

ARTICLE VI.

Officers shall be chosen by ballot, and a majority of votes shall be sufficient for a choice.

ARTICLE VII.

By-laws for the more particular regulation of the Society, shall from time to time be made.

ARTICLE VIII.

This Constitution may be altered or amended in any of the preceding articles, by a vote to that effect, of three fourths of the members: but the article which immediately follows this, shall be unalterable.

ARTICLE IX.

The consent of every member shall be necessary, to a dissolution of the Society. In case of a dissolution, the property of the Society shall not be distributed among the members, but donors may claim and receive such donations as they have made to the museum, and the remainder shall be given to some public institution, on such conditions as may then be agreed on; and the faithful performance of such conditions, shall be secured by bonds with sufficient penalties for the non-fulfilment thereof.

BY-LAWS.

SECTION I.

OF MEMBERS.

Art. 1. Every person who shall have been elected a member of this Society, shall subscribe an obligation, promising to conform to the Constitution and By-laws thereof, and shall pay into the treasury an initiation fee of five dollars. He shall possess none of the rights of membership, nor shall his name be borne upon the roll of members until the said fee shall have been paid. Any person of respectable character and attainments, residing in the city of Boston, or its immediate neighbourhood, shall be eligible as a member of this Society.

Art. 2. Corresponding and Honorary members shall not be required to pay an initiation fee, or other contribution. Corresponding members shall consist of persons not resident in the city, who may be interested in the study of Natural History, or desirous of promoting the interests of the Society. Honorary members shall be selected from persons eminent for their attainments in science, on whom the Society may wish to confer a compliment of respect.

Art. 3. Persons who have been unsuccessful candidates for admission, shall not be again proposed as members until after one year.

Art. 4. Any member may withdraw from the Society, by giving written notice of his intention, and paying all arrearages due from him. A refusal or neglect on the part of a member to pay any due for the space of one year,

shall be considered an intimation of a wish to withdraw from the Society. And it shall be the duty of the Treasurer to report the names of such delinquent members yearly to the Council, at their first meeting after the annual meeting, who shall thereupon order their names to be stricken from the rolls.

ART. 5. Members may be expelled from the Society, by a vote of three fourths of the members present, at a meeting specially called for that purpose, by a notice given at least one month previous.

SECTION II.

OF OFFICERS AND THEIR DUTIES.

ART. 1. The President shall preside at meetings of the Society and of the Council; shall preserve order, regulate debates, and announce donations and other interesting information.

ART. 2. The Vice-President shall perform the duties of President, in his absence.

ART. 3. The Corresponding Secretary shall conduct the correspondence of the Society, and keep a record thereof; acknowledge all donations; notify corresponding members of their election, and receive and read to the Society all communications on scientific subjects which may be addressed to him.

ART. 4. The Recording Secretary and Clerk shall take and preserve correct minutes of the proceedings of the Society and Council, in a book to be kept for that purpose; shall have the charge of the papers and documents belonging to the Society, and of their common seal; shall notify members of their election, and committees of their appointment, and shall call meetings when directed by the President.

ART. 5. The Treasurer shall have charge of all moneys and other property of the Society, except their Library and

Museum; shall collect all fees and assessments, and receive any donations in money which may be made to it; shall pay all accounts against the Society, when the same are approved by a vote of the Council; shall keep a correct account of all receipts and expenditures in a book belonging to the Society, and shall at each annual meeting, and at other times when required by the Council, make a detailed report of the same.

Art. 6. The Librarian shall have control of the books belonging to the Society, or deposited for their use; he shall make a correct catalogue of them, and keep a record of such as are taken from the Library by the members; shall permit the use of the Library to members and others, under such regulations as may from time to time be adopted, and shall annually report the condition of the Library.

Art. 7. The Curators shall be intrusted with the care of the Museum. They shall, within six weeks after a donation is made, deposit such donation in their particular Cabinets. Each Curator shall have his particular department allotted to him at the time of his election. The Curator having charge of any division of the collection, shall keep the keys thereof; shall arrange the specimens after some approved system, and, so far as is practicable, label them with the names they bear in such system. He shall keep a correct catalogue of articles in his care, and shall be alone authorized to select duplicate specimens from the Cabinet, and effect exchanges. He may select from among the members of the Society a person to assist him in arranging and labelling the specimens. The Curators shall, at the annual meeting, make a written report to the Society, concerning the Museum, the state of the different collections, the additions made during the past year, and the deficiencies which exist.

Art. 8. The Cabinet Keeper shall have the general charge of the room or rooms belonging to the Society; shall

see that their contents are kept in the best order; shall select a competent person as a porter or attendant, and this person shall be considered as under his immediate control. He shall also, when convenient, attend personally, during the days of public visitation.

Art. 9. The Council shall provide suitable rooms for the meetings of the Society, for lectures, and for the Museum: they shall select the subjects of the lectures, regulate the order in which they shall be given, and determine on what terms the public may be admitted to them; appoint Lecturers, and fix their compensation; authorize the expenditure of money for the increase of the Library and Museum, and designate the books which shall be purchased; and do any other acts not inconsistent with the Constitution and By-laws, which they may think necessary to the continuation and success of the Society.

SECTION III.

OF ASSESSMENTS.

Art. 1. Every member who shall have resided in the city of Boston, or within ten miles thereof, during the six months preceding the first of October in each year, or during any part of said term, shall be subject to an annual assessment of three dollars, payable on that day; Provided, that no assessment shall be required of any member during the six months succeeding his election.

Art. 2. Any member who shall pay into the treasury at one time, the sum of thirty dollars, shall be exempt from the annual assessments.

Art. 3. Whenever a member of this Society shall become acquainted with a young man of good moral character, who is desirous of joining the Society from a pure love of Natural Science, and shall be aware of his inability to become a member should an initiation or assessment fee be demanded, — he shall be allowed to nominate the said indi-

vidual in the usual way, sparing his feelings by making no reference to his situation. But in case of his election, he shall state his situation to the Treasurer, and pledge the honor of the individual elected, that all the fees which would ordinarily be demanded, shall be promptly paid, except arrears, whenever his situation will allow; and the Treasurer shall make known his circumstances to no one save his successor, who shall as carefully guard his feelings.

SECTION IV.

OF THE LIBRARY.

Art. 1. The Library shall consist of works on Natural History, and other subjects connected therewith.

Art. 2. The selection of Books to be purchased for the Library, shall be made by the Council; but for the present, such books only shall be purchased, as are not found in other public Libraries in the city of Boston.

Art. 3. Members may deposit books in the Library for the use of the society; but such books shall not be taken from the Library-room, without the consent of the owners.

Art. 4. The Society shall be responsible for the safe-keeping and careful usage of books deposited, and shall recompense the owners for any damage which may occur to them, while in the Society's keeping.

Art. 5. Books owned by the Society may be taken from the Library by members, upon signing a receipt for the same, and promising to make good any damage which may be sustained when in their possession, and to replace the same if lost.

Art. 6. The Council may prohibit valuable and rare books from circulation.

Art. 7. Books shall not be kept from the Library more than one calendar month by the same person.

Art. 8. The Council may appoint particular days for taking books from the Library.

Art. 9. All Books shall be returned to the Library on the third Wednesday of April annually, and remain one fortnight; and any person then having one or more books, and neglecting to return the same, shall be reminded of his delinquency by the Librarian.

Art. 10. The Council may extend the use of the Library to other persons than members.

SECTION V.

OF THE MUSEUM.

Art. 1. The Museum shall consist of collections in the different departments of Natural History.

Art. 2. All specimens sent to the Museum shall be considered the property of the Society, unless the owner shall make known in writing his wish to retain the privilege of withdrawing them.

Art. 3. When a member deposits in the Museum a sufficient number of articles to fill an entire case, a key of the case shall be at all times at his command.

Art. 4. The names of donors, with the articles given, shall in every instance be recorded in a book kept for that purpose, by the curators of each department.

Art. 5. No specimens shall be removed from the Museum, without the leave of the Council.

Art. 6. Members, corresponding members, and patrons, shall have access to the Museum, at all times, subject to the regulations of the Council.

Art. 7. Members or other persons desirous of examining or describing specimens, or of taking them from the cases, for the purpose of study, must apply to the curators, who have charge of them.

Art. 8. At the meeting in October, a committee of

three members shall be appointed, who shall report at the next meeting on the state of the Cabinet and Library.

SECTION VI.

OF LECTURES.

ART. 1. Public lectures shall be annually given under the auspices of the Society, on the several branches of Natural History.

ART. 2. The order in which the lectures shall follow each other, shall be fixed by the Council.

ART. 3. Members of the Society shall have free admission to the lectures; other persons shall be admitted on such terms as the Council shall prescribe.

ART. 4. The moneys received for admission to the lectures, shall go to pay the compensation of Lecturers and other expenses; the balance, if any, shall be paid into the Treasury of the Society.

SECTION VII.

OF MEETINGS.

ART. 1. A meeting shall be held on the first Wednesday in May annually, for the choice of officers and other general purposes. At this meeting, reports shall be made, by the Treasurer, on the state of the funds; by the Librarian, on the condition of the Library; and by the Curators, on the condition of the Museum.

ART. 2. Stated meetings of the Society shall be held on the first Wednesday of every month.

ART. 3. Six members shall form a quorum for business.

ART. 4. Members will be expected to communicate at the meetings of the Society, such interesting information as may come into their possession respecting Natural History in general, and particularly any new facts respecting that of our own country.

Art. 5. Written communications on subjects connected with Natural History, may be made by the members; the subjects, and time of reading, shall be chosen by themselves; but after the same shall have been read, the opinions and facts therein contained, shall be open to remark by other members.

Art. 6. The order of proceeding at meetings shall be as follows, to wit:

1. Record of preceding meeting read.
2. Written communications read.
3. Verbal communications made.
4. Business called up by special resolutions.
5. Donations announced.
6. Candidates for membership proposed.
7. Adjournment.

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The "Courtis Fund" represents a part of the income obtained from the legacy of the late Ambrose S. Courtis.

I. GENERAL WORKS.

315. *Philadelphia.* Academy of Natural Sciences at Philadelphia, Journal of. 8vo. 8 vols. Philadelphia: 1820-39. Academy of Natural Sciences.
316. *Albany.* Transactions of the Albany Institute. vols. 1 and 2. 8vo. Albany: 1830-38. Albany Institute.
317. *American* Academy of Arts and Sciences, Memoirs of, to the end of the year 1783. 4to. 1785. Winslow Lewis, Jr.
318. *Boston* Journal of Natural History. 3 vols. 8vo. Boston: 1834-41. Containing Papers and Communications read to the Boston Society of Natural History.
319. *Hartford.* Transactions of the Natural History Society of Hartford. 1 No. 8vo. 1836. Society.
320. *Jesse.* Gleanings in Natural History. By Edward Jesse. 12mo. Philadelphia: 1833. — 2d series. 8vo. London: 1834. Amos Binney.
321. *Journal* of a Naturalist. 12mo. Philadelphia: 1831. Amos Binney.
322. *Liverpool.* First Report of the Liverpool Natural History Society. 8vo. pamphlet. Liverpool: 1836. Francis Alger.
323. *Maryland.* Transactions of the Maryland Academy of Science and Literature. vol. 1, part 1. 8vo. pamphlet. Baltimore: 1837. Academy.

324. *Silliman.* American Journal of Science and Arts. Conducted by Benjamin Silliman. 8vo. New Haven. Vols. 1 to 23. Ezra Weston, Jr. — Volumes 23 to 40, Benjamin Silliman.
325. *Memoires* du Museum d'Histoire Naturelle par les Professeurs de cet Établissement. 4to. 1815 - 18. Paris.
326. *Rymsdyk.* Museum Britannicum. Being an Exhibition of the Curiosities of the British Museum. By John and Andrew Von Rymsdyk. Folio. London: 1778. F. W. P. Greenwood.
327. *New York.* Annals of the Lyceum of Natural History, of New York. 1834 - 36. 8vo. 2 vols., and Nos. 5. to 14 of Volume 3. Lyceum.
328. *London.* Philosophical Transactions of the Royal Society of London. 4to. London. vols. 47 to 96. 1752 - 86. George B. Emerson.
329. *Swainson.* Taxidermy; with the Biography of Zoologists and Notices of their Works. By William Swainson. 12mo. London: 1840. Audubon Fund.
330. *White.* Natural History of Selborne. By the late Rev. Gilbert White. 12mo. Philadelphia: 1832. Amos Binney. — The same. 8vo. London: 1832. Simon E. Greene.
331. *Virey.* Philosophie de l'Histoire Naturelle. Par J. J. Virey. 12mo. Bruxelles: 1835. Amos Binney.
332. *Bradley.* A Philosophical Account of the Works of Nature. By Richard Bradley. 4to. London: 1721. F. W. P. Greenwood.
333. *Blumenbach.* Manuel de l'Histoire Naturelle, traduit de l'Allemand de J. Fr. Blumenbach, par Soulange, Artaud. 8vo. 2. Amety; 1803. Deposited by W. Lewis, Jr.
334. *Flint.* Lectures on Natural History. By Timothy Flint. 8vo. Boston: 1833.
335. *Stark.* Elements of Natural History. By John Stark. 8vo. 2. Edinburgh: 1828. Simon E. Greene.
336. *Buffon.* Œuvres completes de Buffon, mises en ordre et précédés d'une Notice historique par M. A. Richard, suivies de la Classification comparée d'après MM. Cuvier, Lesson, &c. 8vo. 5. Paris: 1838. Audubon Fund.
337. *Jardine.* Naturalist's Library. Conducted by Sir William Jardine. 12mo. 18. Edinburgh: 1833 - 37. Courtis Fund.
338. *Loudon.* Magazine of Natural History. Conducted by J. C. Loudon. 8vo. 1 to 9. London: 1828 - 37. Also, Nos. 1 to 6 of new series. Simon E. Greene.
339. *Malta,* Natural History of, partly in MSS. The geological part by J. H. Frera and Dr. Terafa; the botanical part by Dr. Terafa, and the zoological by G. Trafani. 4to. 1. 1827. Sir John Stoddart, Chief Justice of Malta.
340. *Bomare.* Dictionnaire raisonné universel d'Histoire Naturelle. Par M. Valmont de Bomare. 8vo. 5. Paris: 1764. C. K. Dillaway.
341. *Boitard y Canivet.* Manual del Naturaliste Disector. Pór Boitard y Canivet. 18mo. Madrid: 1833. F. W. P. Greenwood.
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343. *British Museum,* Synopsis of the Contents of. 8vo. London: 1809. T. J. Whittemore.
344. *Lempriere.* Popular Lectures on the Study of Natural History. By William Lempriere, M. D. 2d ed. 8vo. London: 1830. Simon E. Greene.

345. *Natural* History of Animals, done into English by a Fellow of the Royal Society. 4to. London: 1702. F. W. P. Greenwood.
346. *St. Petersburg.* Memoires de l'Academie Imperiale des Sciences de St. Petersbourg. 6 nos. 4to. 1837–8. Charles Cramer.

II. ZOOLOGY.

347. *Audubon.* The Birds of America, from original Drawings. By John James Audubon. Elephant folio. 4. London: 1827–38. Thomas H. Perkins.
348. *Swainson.* Second Series of new Zoological Illustrations. The Drawings and Descriptions by William Swainson. Nos. 11 to 16. 8vo. London. Pamphlet. Simon E. Greene.
349. *Salem.* Journal of the Essex County Natural History Society. 8vo. 1836. Nos. 1 and 2. Society.
350. *Shaw.* General Zoology. By George Shaw. With Plates by Mrs. Griffith. Vols. 1, 2, 6, 8, 10, 13; also part 1st, vol. 14. Amos Binney, D. H. Storer, and Courtis Fund.
351. *Bell.* A History of British Reptiles. By Thomas Bell. 8vo. London: 1839. H. Doubleday.
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353. *Coste.* Recherches sur la Generation des Mammifères. Par M. Coste, suivies de Recherches sur la Formation des Embryons. Par MM. Delpech et Coste. 4to. Paris: 1834. Audubon Fund.
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355. *Bewick.* General History of Quadrupeds. By Thomas Bewick. 8vo. Newcastle upon Tyne: 1824. Simon E. Greene.
356. *Potter.* Notes on the Locusta Septentrionalis Americanæ Decem Septima. By Nathaniel Potter, M. D. 8vo. Pamphlet. Baltimore: 1839. Author.
357. *Cuvier.* The Animal Kingdom, arranged in conformity with its Organization. By the Baron Cuvier. With additional Descriptions by Edward Griffith and others. 8vo. 16. London: 1827 to 1835. G. B. Emerson and Courtis Fund.
358. *Weeks.* A Manual, or easy Method of managing Bees. By John M. Weeks. 18mo. Boston: 1840. Henry Colman.
359. *Ellis.* Essai sur l'Histoire Naturelle des Corallines et d'autres Productions marines du même Genre. Par Jean Ellis. 4to. Haye: 1756. D. H. Storer.
360. *Haldeman.* Monograph of the Limniades and other fresh-water Univalve Shells of North America. By S. Stehman Haldeman. Nos. 1 and 2. 8vo. Pamphlet. Philadelphia: 1840. Author.
361. *Sundevall.* Svenska Spindlarnes beskrifning: af Carl. J. Sundevall. 12mo. Stockholm: 1833. J. Lovèn.
362. ———. Conspectus Arachnidum quem cons. ampl. fac. phil. Lund. p. p. D: r. C. J. Sundevall. 12mo. Pamphlet. London: 1833. J. Lovèn.
363. *Köllar.* A Treatise on Insects injurious to Gardeners, Foresters, and Farmers. By Vincent Köllar. 12mo. London: 1840. Audubon Fund.

364. *Zoological* Journal. 8vo. London: 1824-30. Nos. 1 to 18; also parts 1, 2, and 3. of supplementary plates. Simon E. Greene.
365. *Thompson.* Zoological Researches. Nos. 1 to 4. By John V. Thompson. 8vo. Cork: 1828-30. Simon E. Greene.
366. *Morton.* Catalogue of Skulls of Men and the inferior Animals in the Collection of Samuel G. Morton, M. D. 8vo. Pamphlet. Philadelphia. Author.
367. *Doubleday.* A Nomenclature of British Birds. By Henry Doubleday. 2d edit. 8vo. Pamphlet. London: 1839. E. Doubleday.
368. *Entomological* Magazine. 8vo. London. Nos. 1 to 24. Editors.
369. *Harris.* Descriptive Catalogue of the North American Insects, belonging to the Linnæan Genus Sphinx, in the Cabinet of Thaddeus William Harris. 8vo. Pamphlet. Cambridge: 1839. T. W. Harris.
370. *Huish.* Cottager's Manual, for the Management of Bees. By Robert Huish. 12mo. London. Simon E. Greene.
371. *Pickering.* Description of a Species of Caligus, C. Americanus. by Charles Pickering, M. D., and James D. Dana. 8vo. Pamphlet. New Haven: 1836. Authors.
372. *Jay.* Catalogue of the Shells, arranged according to the Lamarckian System, together with Descriptions of new and rare Species, in the Collection of J. C. Jay. 4to. New York: 1839. J. C. Jay.
373. *Kiener.* General Species and Iconography of recent Shells. By L. C. Kiener. Translated from the French by D. H. Storer, M. D. 8vo. Pamphlet. No. 1. Boston: 1837. Translator.
374. *Latham.* A General History of Birds. By John Latham, M. D. 4to. 10. Winchester: 1821. Audubon Fund.
375. *Lesson.* Manuel d'Ornithologie. Par R. P. Lesson. 18mo. 2. Paris: 1828. T. G. Bradford.
376. *McClelland.* Indian Cyprinidæ. By John McClelland. Being Vol. XIX., part 2d, of Asiatic Researches. 4to. Calcutta: 1839. Author.
377. *Munro.* Structure and Physiology of Fishes explained and compared with those of Man and other Animals. Illustrated with Figures. By Alexander Munro. Folio. Edinburgh: 1785. Deposited by W. Lewis, Jr.
378. *Redi.* Francisci Redi Experimenta circa Generationem Insectorum. 18mo. Amstelodami: 1736. D. H. Storer.
379. *Richardson.* Fauna Boreali Americana; or the Zoology of the Northern Part of British America. The Quadrupeds. By John Richardson, assisted by William Swainson and William Kirby. 4to. London: 1829. Deposited by W. Lewis, Jr.— Part 3d. The Fishes. 4to. London: 1838. Author.
380. ————. Report on North American Zoology. By John Richardson. 8vo. Pamphlet. London: 1837. Author.
381. *Sowerby.* Conchological Manual. By George B. Sowerby, Jr. 500 figures. 8vo. London: 1839. Author.
382. *Bischoff.* Exposition de la Doctrine de Gall sur le Cerveau et le Crane. Par le Dr. C. H. E. Bischoff. 8vo. Pamphlet. Berlin: 1806.
383. *Dandolo.* L'Art d'éléver les Vers à Soie. Par Mons. le Conte Dandolo. 8vo. Lyons: 1830. J. P. Couthouy.
384. *Massachusetts.* Report of the Commissioners on the Zoological Survey of the State. 8vo. Pamphlet. Boston: 1838. Commissioners.

385. *Storer.* Report on the Fishes and Reptiles of Massachusetts. By D. H. Storer. 8vo. Boston: 1838. Author.
386. *Yeats.* Institutions of Entomology. By Thomas P. Yeats. 8vo. London: 1773. D. H. Storer.
387. *Jenyns.* A Manual of British Vertebrated Animals. By Rev. Leonard Jenyns, M. A. 8vo. Cambridge (Eng.): 1835. Author.
388. *Radovan.* Manuel complet théorique et pratique des Proprietaires d'Abeilles. Par J. Radovan. 12mo. Paris: 1828.
389. *Nordmann.* Mikrographische Beiträge zur Naturgeschichte der Wirbellosen Thiere, von Alex. V. Nordmann. 4to. Berlin: 1822. C. Zimmerman.
390. *Wiedemann.* (C. R. W.) Aussereuropäische Zweiflügelige Insecten. Hamm, 8vo. 2. 1828. C. Zimmerman.
391. *Innes.* A short Description of the Human Muscles, arranged as they appear on Dissection, together with their several Uses and the Synonyma of the best Authors. By John Innes. 8vo. New York. 1818. C. K. Dillaway.
392. *Westwood.* Natural History of the Insects of China. By J. O. Westwood. 4to. London: 1838. Audubon Fund.
393. ———. Natural History of the Insects of India. By J. O. Westwood. 4to. London: 1838. Audubon Fund.
394. *Tyson.* Orang-Outang, sive Homo sylvestris; or the Anatomy of the Pigmie compared with that of a Monkey, an Ape, and a Man. By Edward Tyson. 4to. London: 1699. Deposited by W. Lewis, Jr.

III. BOTANY.

395. *White.* Account of the regular Gradation in Man and in different Animals and Vegetables. With Engravings. By Charles White. 4to. London: 1799. Deposited by W. Lewis, Jr.
396. *Blackstone.* Specimen Botanicum. Auctore J. Blackstone. 18mo. London: 1746. Edward Tuckerman, Jr.
397. *Croom.* Catalogue of Plants, native and naturalized, in the vicinity of Newbern, N. C., with Remarks and Synonyms. By H. B. Croom. 8vo. Pamphlet. New York.
398. *Colman.* Third Report of the Agriculture of Massachusetts, on Wheat and Silk. By Henry Colman. 8vo. Pamphlet. 1840. G. B. Emerson.
399. *Darlington.* Flora Cestrica: An Attempt to enumerate and describe the flowering and filicoid Plants of Chester County, in Pennsylvania. By William Darlington. 8vo. West Chester: 1837. Author.
400. *Acharius.* Lichenographiæ Suecicæ Prodromus. Auctore Erik Acharius. 8vo. Lincopia. D. J. Bjoon. 1798. D. H. Storer.
401. ———. One copy deposited by B. D. Greene. 8vo. Charleston, S. C.: 1821.
402. *Greville.* Algæ Britannicæ. By Robert Kaye Greville. 8vo. London. 1830. Simon E. Greene.
403. *Gray.* Remarks on the Structure and Affinities of the Order Ceratophyllaceæ. By Asa Gray. 8vo. Pamphlet. New York. J. P. Couthouy.
404. *Horticultural* Register and Gardener's Magazine. Edited by

T. G. Fessenden and J. E. Teschemacher. 8vo. 3. 1835-8. Boston. Editors.

405. *Lindley.* School Botany. By John Lindley. 12mo. London: 1839. Audubon Fund.

406. *Linnæus.* Prælectiones in Ordines naturales Plantarum. 8vo. Hamburgi: 1792. Edward Tuckerman, Jr.

407. *Manuel Blanco.* Flora de Filipinas; segun el Sistema sexual de Linneo. Por el P. Fr. Manuel Blanco. 8vo. Manila: 1837.

408. *Don.* General System of Gardening and Botany. By George Don. 4to. London: 1831. Vols. 1, 2, and 3. Simon E. Greene.

409. *Richard.* Mémoires sur les Conifères et les Cycadées, ouvrage posthume de L. C. Richard. Terminé et publié par Achille Richard, Fils. 4to. Paris: 1826. Audubon Fund.

410. *Duchesne.* Repertoire des Plantes utiles et des Plantes veneneuses du Globe. Par E. A. Duchesne. 8vo. Paris: 1836.

411. *Dyck.* Hortus Dyckensis; ou Catalogue des Plantes cultivées dans les Jardins de Dyck. 8vo. Dusseldorf: 1834. F. W. P. Greenwood.

412. *Hooker.* The British Flora; comprising the Phenogamous or Flowering Plants and the Ferns. By William Jackson Hooker. 8vo. London: 1830. Deposited by B. D. Greene.

413. ———. Botanical Miscellany. By William Jackson Hooker. 8vo. 3. London: 1830. Audubon Fund.

114. *Humboldt.* Floræ Fribergensis specimen, Plantas cryptogamicas præsertim subterraneas exhibens. Edidit Fred. Al. ab Humboldt. 4to. Berolini: 1793. F. W. P. Greenwood.

115. *Tatham.* Essay on the Culture and Commerce of Tobacco. By William Tatham. 8vo. London: 1800. D. H. Storer.

116. *Barton.* Elements of Botany. By Benjamin Smith Barton, M. D. 8vo. Philadelphia: 1803. C. P. Curtis, Jr.

417. *De Candolle.* Introduction à l'Étude de la Botanique, ou Traité élémentaire de cette Science. Par Alph. De Candolle. 8vo. 2. Paris: 1835. G. B. Emerson.

418. *Lindley.* Natural System of Botany. By John Lindley. 2d ed. 8vo. London: 1836. Audubon Fund.

419. *Locke.* Outlines of Botany. By John Locke, M. D. 12mo. Boston: 1819. Simon E. Greene.

420. *Scuderi.* Dissertazione Agrarie riguardanti il Regno di Sicilia di Salvadore Scuderi. 12mo. Catania: 1812. Author.

421. *Torrey* and *Gray.* A Flora of North America, by John Torrey and Asa Gray. Vol. 1. 8vo. New York: 1838. Thomas Lee.

422. *Teschemacher.* A concise Application of the Principles of structural Botany to Horticulture, by J. E. Teschemacher. 18mo. Boston: 1840. Author.

423. *Sprengel.* Introduction to the Study of Cryptogamous Plants. In Letters. By Kurt Sprengel. 8vo. London: 1807. Deposited by S. C. Foster.

424. *Van Mons.* Arbres fruitiers, leur Culture en Belgique, &c. Par J. B. Van Mons. 12mo. 2. Louvain: 1835. J. E. Teschemacher.

425. *Wernischek.* Genera Plantarum ordinavit et edidit Jacobus Wernischek. 18mo. Vienna, Austria: 1763. Edward Tuckerman, Jr.

426. *Wright* and *Hall.* Catalogue of Plants growing without Cultivation in the Vicinity of Troy. By John Wright and James Hall. 8vo. Pamphlet. Troy: 1836. Authors.

IV. MINERALOGY AND GEOLOGY.

427. *Lea.* Notice of the Oolitic Formation in America, with Descriptions of some of its Organic Remains. By Isaac Lea. 4to. Pamphlet. Philadelphia: 1840. Author.

428. *Cramer.* Etwas über die Natur-Wunder in Nord America, zusammengetragen von Charles Cramer. 8vo. Pamphlet. St. Petersburg: 1837. Author.

429. *Dufrénoy.* Mémoires pour sérvir à une Description géólogique de la France. Par MM. Dufrénoy et Elie de Beaumont. 8vo. Vol. 1st. Paris: 1830. G. B. Emerson.

430. *Reports* of a Committee for investigating the Coal and Mineral Resources of India. 8vo. Pamphlet. Calcutta: 1838. Authors.

431. *Robinson.* Catalogue of American Minerals and their Localities. By Samuel Robinson, M. D. 8vo. Boston: 1825. Simon E. Greene.

432. *Comstock.* Elements of Mineralogy. By J. L. Comstock, M. D. 8vo. Boston: 1827. Simon E. Greene.

433. *Houghton.* Geological Report of the State of Michigan. By Douglas Houghton. 8vo. Pamphlet. 1839. R. C. Winthrop.

434. *New York.* Report on the Geological Survey of the State, made to the Assembly February 27th, 1839. 8vo. Pamphlet. New York. E. Emmons.

435. —— ——. Geological and Mineralogical Reports for 1837. By Lewis C. Beck, W. W. Mather, E. Emmons, T. A. Conrad, and L. Vanuxem. 2d ed. 8vo. Pamphlet. Albany: 1840. E. Emmons.

436. *London.* Proceedings of the Geological Society of London. 8vo. 2 vols. and 12 numbers. London: 1834–40. Geological Society.

437. *New York.* Annual Report of the Superintendent and Inspector of Salt, in Onandaga Co., New York. 8vo. Pamphlet. 1841. J. P. B. Storer.

438. *Gairdner.* Essay on Mineral and Thermal Springs. By Meredith Gairdner. 8vo. London: 1832. T. G. Bradford.

439. *Redfield.* The Fossil Fishes of Connecticut and Massachusetts. By John H. Redfield. 8vo. Pamphlet. New York: 1836. Author.

440. *Buch.* Explication de deux Planches de Spirifer et d'Orthis. Par Leopold de Buch. Folio. Berlin: 1839. Author.

441. *Daubeney.* Sketch of North America. By Charles Daubeney. 8vo. Pamphlet. Oxford: 1829. Author.

442. *Eaton.* Index to the Geology of the Northern States. By Amos Eaton. 12mo. Troy, N. Y.: 1820. G. B. Emerson.

443. *Jackson.* Report of the Geological and Agricultural Survey of the State of Rhode Island. By Charles T. Jackson, M. D. 8vo. Pamphlet. Providence: 1840. Providence Franklin Society. —Another copy by the Author.

444. *Green.* Monograph of the Trilobites of North America, with colored Models of the Species. By Jacob Green, M. D. 12mo. Philadelphia: 1832.

445. *Mantell.* The Wonders of Geology. By Gideon Algernon Mantell. 18mo. 2. London: 1839. Audubon Fund.

446. *Lyell.* Address before the Geological Society of London. By Charles Lyell. 8vo. Pamphlet. London: 1837. Author.

447. *Jackson.* Second Annual Report on the Geology of the Public Lands of Maine and Massachusetts. By C. T. Jackson. 8vo. Pamphlet. Augusta: 1838. Author.
448. ———. Third Annual Report on the Geology of the State of Maine. By Charles T. Jackson. 8vo. Pamphlet. Augusta: 1839. Author.
449. *Moore.* Ancient Mineralogy. By N. F. Moore. 12mo. New York: 1834. George B. Emerson.
450. *Buch.* Petrifications recueillies en Amerique par Mr. Alexandre de Humboldt et par Mr. Charles Degenhardt, decrites par Leopold de Buch. Folio. Berlin: 1839. Leopold de Buch.
451. *Rogers.* Report on the Geological Survey of the State of New Jersey. By William B. Rogers. 8vo. Pamphlet. Philadelphia: 1836.
452. ———. Report on the Geological Reconnoissance of the State of Virginia. By William B. Rogers. 8vo. Pamphlet. Philadelphia: 1836. T. G. Bradford.
453. *Feuchtwanger.* A Treatise on Gems, in reference to their practical and scientific Uses. By Dr. Lewis Feuchtwanger. 8vo. New York: 1838. Author.
454. *Taylor.* Two Reports on the Coal Mines of Pennsylvania. By Richard C. Taylor. 8vo. Pamphlet. Philadelphia: 1840. Amos Binney.
455. *Mineralogical* Tracts. 4to. Fryberg: 1785 to 1818.
456. " " 8vo. Berlin: 1809.
457. " " 8vo. Fryberg: 1807. Amos Binney.
458. *Lithographie* Sicilienne, ou Catalogue raisonné de toutes les Pierres de la Sicilie, par M. la C. D. B. C. D. C. de plusieurs Académies. 4to. Pamphlet. Naples: 1777. Amos Binney.
459. *Monticelli.* Observations et Experiences faites au Vesuve, pendant 1821 et 1822. Par T. Monticelli et N. Covelli. 8vo. Pamphlet. Naples: 1822.

MISCELLANEOUS.

460. *Hearne.* Journal from Prince of Wales Fort in Hudson's Bay to the Northern Ocean. By Samuel Hearne. 8vo. Dublin: 1776. Deposited by Dr. W. Lewis.
461. *Fergus.* Class Book of Natural Theology. By Henry Fergus. Revised, &c. by Rev. Charles H. Alden. 12mo. 2d ed. Boston: 1837. Gould, Kendall, & Lincoln.
462. *Boston Athenæum.* Catalogue of Books added since 1827. 8vo. Pamphlet. 1840. Athenæum.
463. *Stoddard. Adams. Twining. Hough.* Addresses delivered at their Inauguration as Professors of Middlebury College. 8vo. Pamphlet. 1839. C. B. Adams.
464. *Dombalse.* Faits et Observations sur la Fabrication du Sucre de Bêteraves, et sur la Distillation des Mélasses. Par C. J. A. Mathieu de Dombalse. 12mo. Paris: 1831. Joseph P. Couthouy.
465. *Mechanic's* Magazine. Nos. 1 to 5 of vol. 9. 8vo. New York: 1837. Mechanics' Institute of New York.
466. *Davy.* Salmonia: or Days of Fly-Fishing. By an Angler. 12mo. Philadelphia: 1832. Simon E. Greene.
467. *Deslongchamps.* Mûriers et Vers à Soie; leur Culture et leur

Education. Par M. Loiseleur Deslongchamps. 8vo. Pamphlet. 1832. Joseph P. Couthouy.

468. *Murray.* Elements of Chemistry. By J. Murray. 8vo. 2. Edinburgh: 1810. Francis Parkman.

469. *Humboldt.* Voyage de Humboldt et Bonpland. Troisiéme Partie. Essai Politique sur le Royaume de la Nouvelle Espagne. 4to. 2. Paris: 1811. — Atlas to the same. Folio. 1812. Amos Binney.

470. *Salem.* East India Marine Society of Salem. By-Laws, &c. 8vo. Pamphlet. Society.

471. ——. Supplement to the same. 8vo. 1837. Pamphlet. Society.

472. *Daubeny.* Introduction to the Atomic Theory. By Charles Daubeny. 8vo. Oxford: 1831. Author.

473. *Harvardiana.* Vol. 4. No. 2. 8vo. Cambridge. N. I. Bowditch.

474. *Irwin.* A Series of Adventures in the Course of a Voyage up the Red Sea, &c. By Eyles Irwin. 4to. London: 1780. D. H. Storer.

475. *O'Reilly.* Greenland, the Ancient Seas, and the North West Passage to the Pacific Ocean. By Bernard O'Reilly. 8vo. New York: 1818. D. H. Storer.

476. *Vermont.* Catalogue of the Books belonging to the University of Vermont. 8vo. Pamphlet. 1836.

477. *Johnson,* Walter R. Report on the Strength of Steam Boilers, read before the Franklin Institute. 8vo. Pamphlet. Author.

478. *Lister.* A Journey to Paris in the Year 1698. By Dr. Martin Lister. 8vo. London: 1699. Edward Tuckerman, Jr.

479. *New York.* Fifty-second Annual Report of the Regents of the University of New York. 8vo. Pamphlet. 1839. — Annual, do. Pamphlet. 1838. Albany Institute.

480. *Mangetus.* Bibliothica Anatomica, sive recens in Anatomia Inventorum Thesaurus locupletissimus. Daniel Le Clerc et Jac. Mangetus. Folio. Geneva: 1685. Deposited by W. Lewis, Jr.

481. *Palermo.* Giornale di Statistica compilato dagl' Impiegati nella Dirizione centrale della Statistica di Sicilia. Vol. 1. 8vo. Pamphlet. 1836. Compilers.

482. *American* Philosophical Society, Proceedings of. Vol. 1. Nos. 8, 9, 10. Pamphlets. Philadelphia: 1839. Society.

483. *Percival.* An account of the Cape of Good Hope. By Capt. Robert Percival. 4to. London: 1804. Deposited by W. Lewis.

484. *Redfield.* Reply to Mr. Espy on the Whirlwind Character of certain Storms. By John H. Redfield. 8vo. Pamphlet. New York: 1836. Author.

485. ——. Remarks on the supposed Connexion of the Gulf Stream with opposite Currents on the Coast of the United States. By William C. Redfield. 8vo. Pamphlet. New York: 1837. Author.

486. *Pinkerton.* A general Collection of the best and most interesting Voyages and Travels in all Parts of the World. By John Pinkerton. 4to. 4. Philadelphia: 1810. Rev. F. Parkman.

487. *Ray.* Three Physico-theological Discourses concerning primitive Chaos, general Deluge, and Dissolution of the World. By John Ray. 8vo. London: 1721. Edward Tuckerman, Jr.

488. *London.* A Companion to the Museum, late Sir Ashton Lever's. 4to. London: 1796. Hon. John Pickering.

489. *Scuderi.* Discorsi pronunziati nella Società Economica di Catania del Cavaliere Salvator Scuderi. 12mo. Pamphlet. Catania: 1837. Author.
490. ———. Memoria sulle Rotazioni Agrarie de Cavaliere Salvatore Scuderi. 12mo. Pamphlet. Palermo: 1835. Author.
491. ———. Discorso sopra una nuova Pianta da Tiglio, dal Cav. Prof. Salv. Scuderi. 12mo. Pamphlet. 1838. Author.
492. *Abbot.* A Description of several new electro-magnetic and magneto-electric Instruments and Experiments. By Joseph Hale Abbot. 8vo. Pamphlet. 1840. Author.
493. *Kalm.* Travels into North America, by Peter Kalm. Translated into English by John R. Forster. 8vo. 3. Warrington: 1770. Courtis Fund.
494. *Schoolcraft.* Narrative of an Expedition through the Upper Mississippi to Stooks Lake, the actual Source of this River. By Henry R Schoolcraft. 8vo. New York: 1834. Amos Binney.
495. *Thénard.* Traité de Chimie élémentaire théorique et practique. Par L. J. Thénard. 2d ed. 8vo. 4. Paris: 1817. G. B. Emerson.
496. *American* Turf Register and Sporting Magazine. Vols. 1 to 6, and 11 numbers of vol. 7. 8vo. Baltimore: 1829 to 1836. Simon E. Greene.
497. *Daubenton.* Advice to Shepherds and Owners of Flocks. Translated from the French of M. Daubenton. 8vo. Boston: 1811. Simon E. Greene.
498. *Poinsett.* Discourse on the Objects and Importance of the National Institution for the Promotion of Science, established at Washington. 1840. By Joel R. Poinsett. 8vo. Pamphlet. Washington: 1841. J. Wyman.
499. *British* Association for the Advancement of Science, Reports of, 8vo. 5. London: 1833 to 1836. Sons of Nathaniel Bowditch.
500. *Vaysse de Villiers.* Itineraire descriptif: ou Description Routière géographique, historique, et pittoresque de la France et de l'Italie. 8vo. 10. Paris: 1818. Courtis Fund.
501. *Russell.* Discourse before the Massachusetts Horticultural Society. By John L. Russell. 8vo. Pamphlet. Boston: 1835. Author.
502. *Rochon.* Voyage to Madagascar and the East Indies. By the Abbé Rochon. 8vo. London: 1793. Deposited by W. Lewis, Jr.
503. *Hovey.* American Gardener's Magazine. Conducted by C. M. and P. B. Hovey. 2. 1835–6. Editors.

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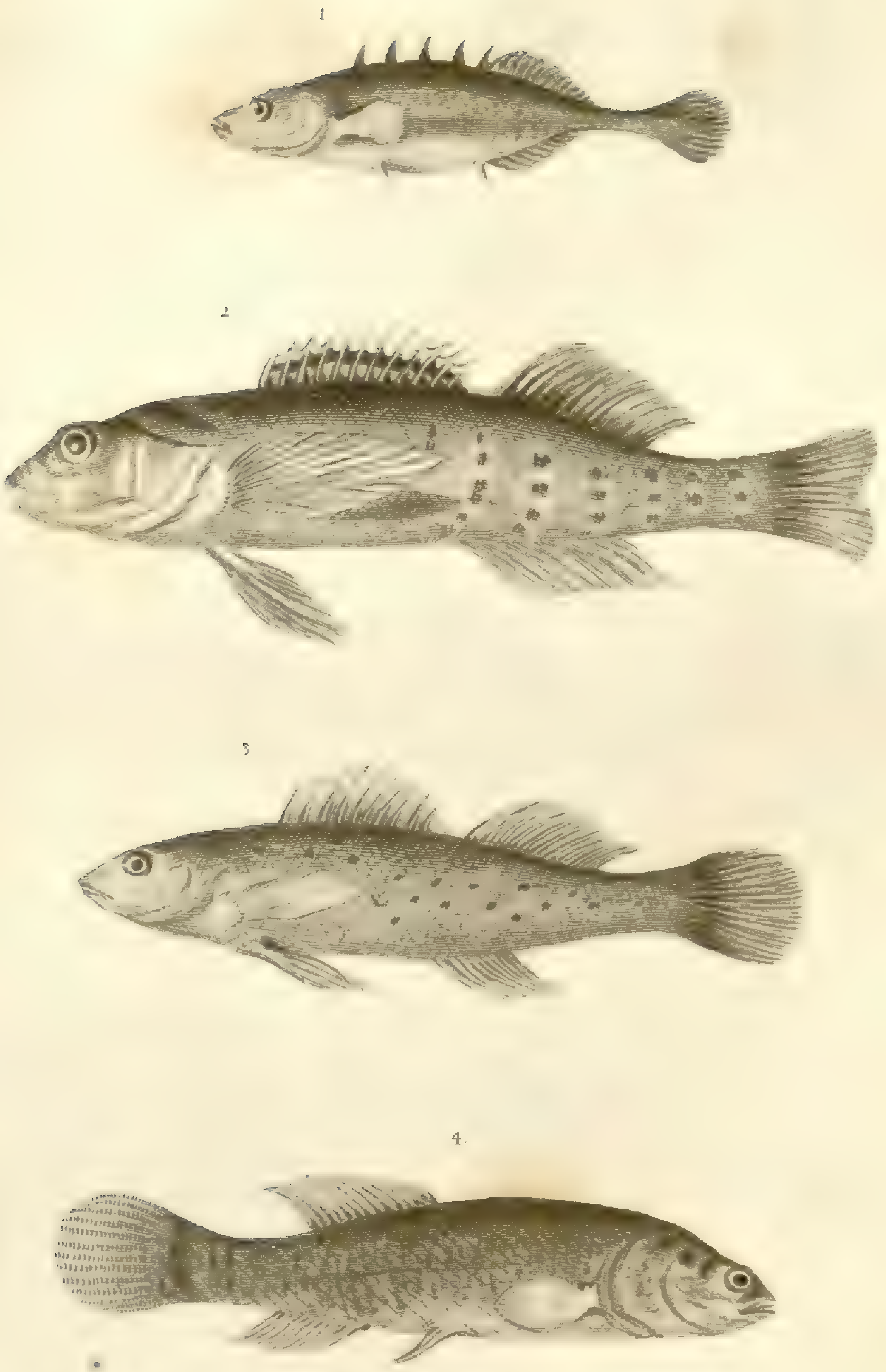
ERRATA.

Page 151, 2nd line from bottom, for " Tringilla " read " Fringilla."
" 217, 5th " " top, for " semipamated " read " semipalmated."
" 234, 4th " " bottom, for " catarractes " read " cataractes."
" 243, 10th " " top, for " Gadwale " read " Gadwall."
" 461, 17th " " top, for " cetrerea " read " cetraria."
" " 8th " " bottom, for " pulmonacæ " read " pulmonacea."
" 467, 16th " " top, for " tridentate " read " tridentata."
" 472, 9th " " bottom, for " ochery " read " ochreous."
" " 4th " " bottom, " decurrect " read " decurrent."
" 479, 5th " " top, for " C." read " A."
" 480, 8th " " bottom, for " Cantrarchus " read " Centrarchus.

Several plates of the Helices described in this volume have been unavoidably deferred, but they will probably be given with the first number of the next volume.

iphargis coriacea *Lin.*

Moore's Lith. Boston



1. *Gasterosteus inconstans.*
2. *Etheostoma variata.*
3. *Etheostoma maculata*
4. *Hydrargira limi*

J. P. Kirtland del: G. F. Storm sc:

1	ANCULOTUS	*costatus*	ANTHONY
2	HELIX	*striatella*	„
3	PALUDINA	*Cincinnatiensis*	„
4	ANCULOTUS	*Kirtlandianus*	„
5		*carinatus*	„
6	PLEUROTOMA	*plicata*	ADAMS
7	CERITHIUM	*terebrale*	„
8	JAMINIA	*producta*	„
9	TORNATELLA	*puncto-striata*	ADAMS
10	PUPA	*armifera*	SAY
11	CYCLAS	*elegans*	ADAMS
12	PUPA	*procera*	GOULD
13	LYMNEA	*pallida*	ADAMS
14		*umbilicata*	„
15	PLANORBIS	*elevatus*	„
16		*virens*	„
17	ANCYLUS	*fuscus*	ADAMS
18	PUPA	*badia*	„
19		*corticaria*	SAY
20		*exigua*	„
21		*simplex*	GOULD
22		*contracta*	SAY
23		*milium*	GOULD

1
3.
2

1
2.
3

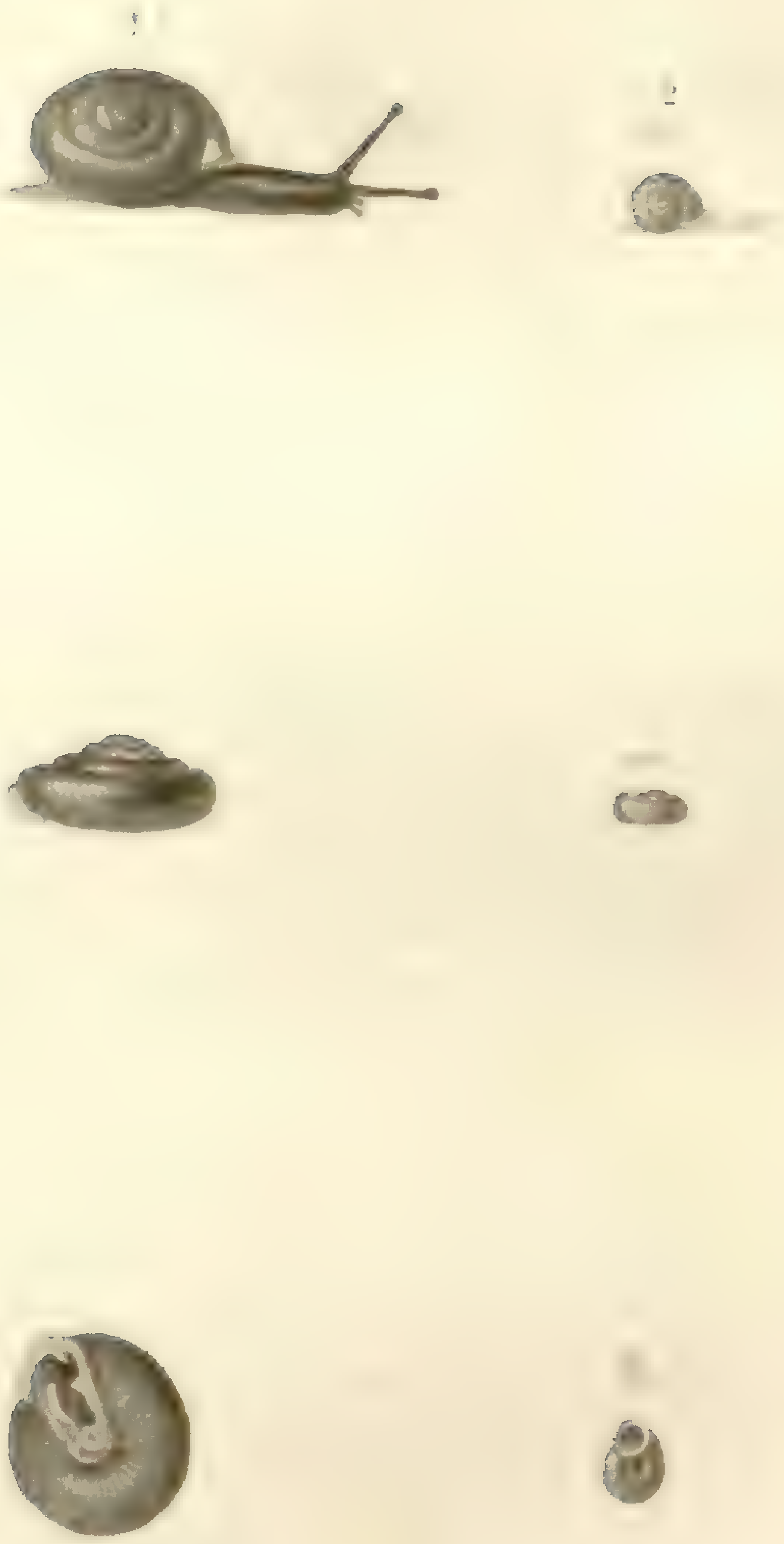
1
2
3

PL. VII.

Helix palliata SAY

PL. VIII.

Helix appressa. SAY.



1. *Helix inflecta*. SAY.

2. *pulchella*. MULLER.

Storm Sc.

Pl. A.

1. *Helix monodon*, RACKETT
2. — *fraterna*, SAY
3. — *hirsuta*

PL. XI.

1. *Helix gularis.* SAY

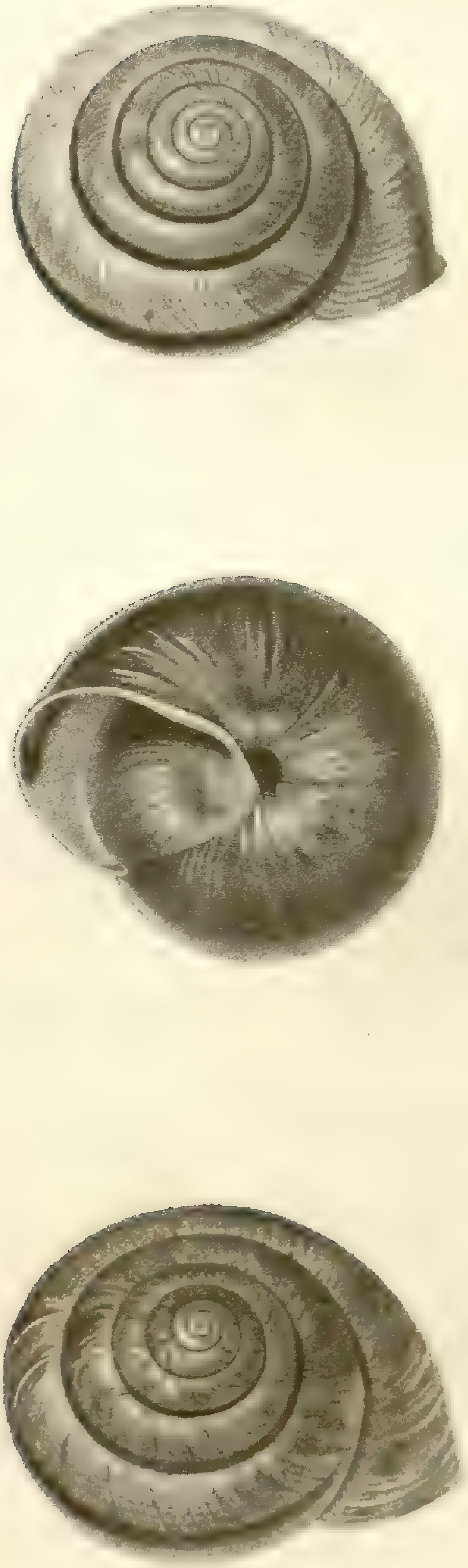
2. . *spinosa.*

3. . *suppressa.* ..

Nutting del.

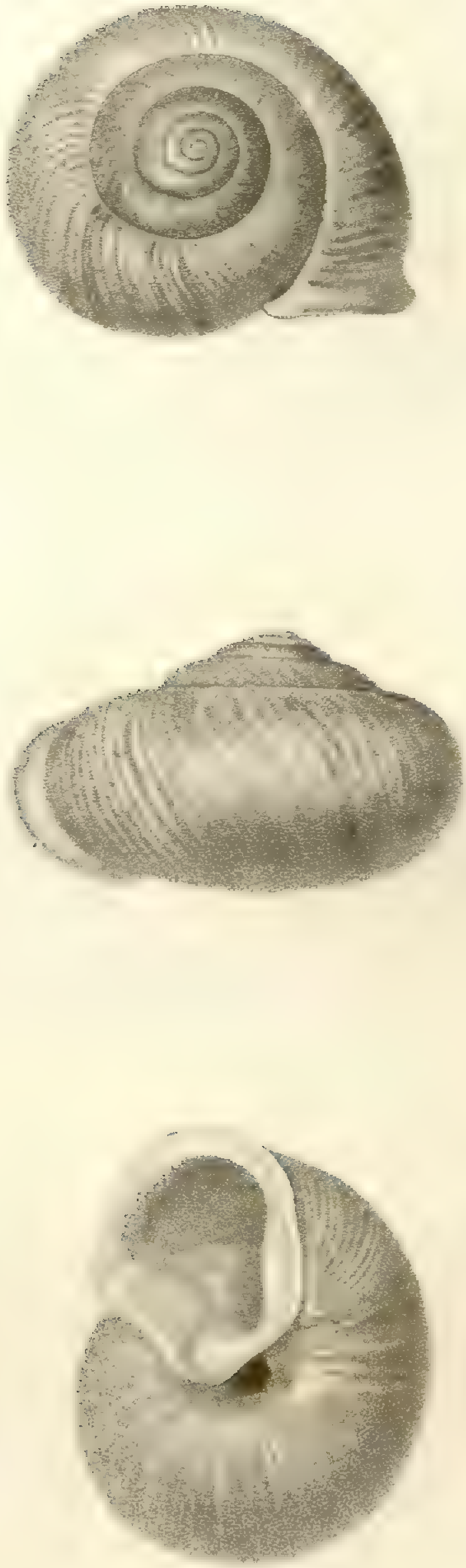
Storm Sc.

PL. XII.



Nutting del. *Helix Nuttalliana*, LEA. Storm S.

Pl. XIII.



Nutting del. *Helix Townsendiana.* LEA. Storm Sc

PL.XCV.

Helix concava, SAY

Helix profunda. SAY.

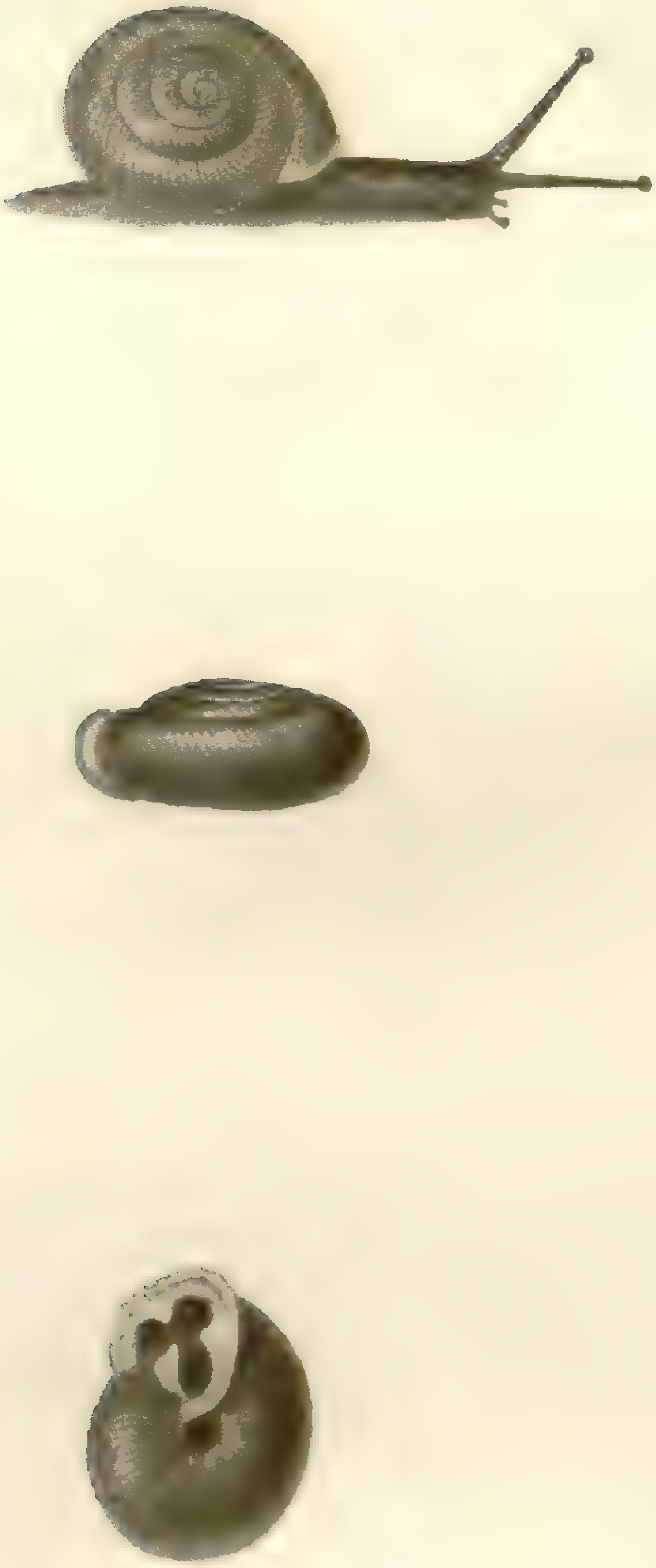
PL. XVI.

Helix Sayii, BINNEY.

Nutting del

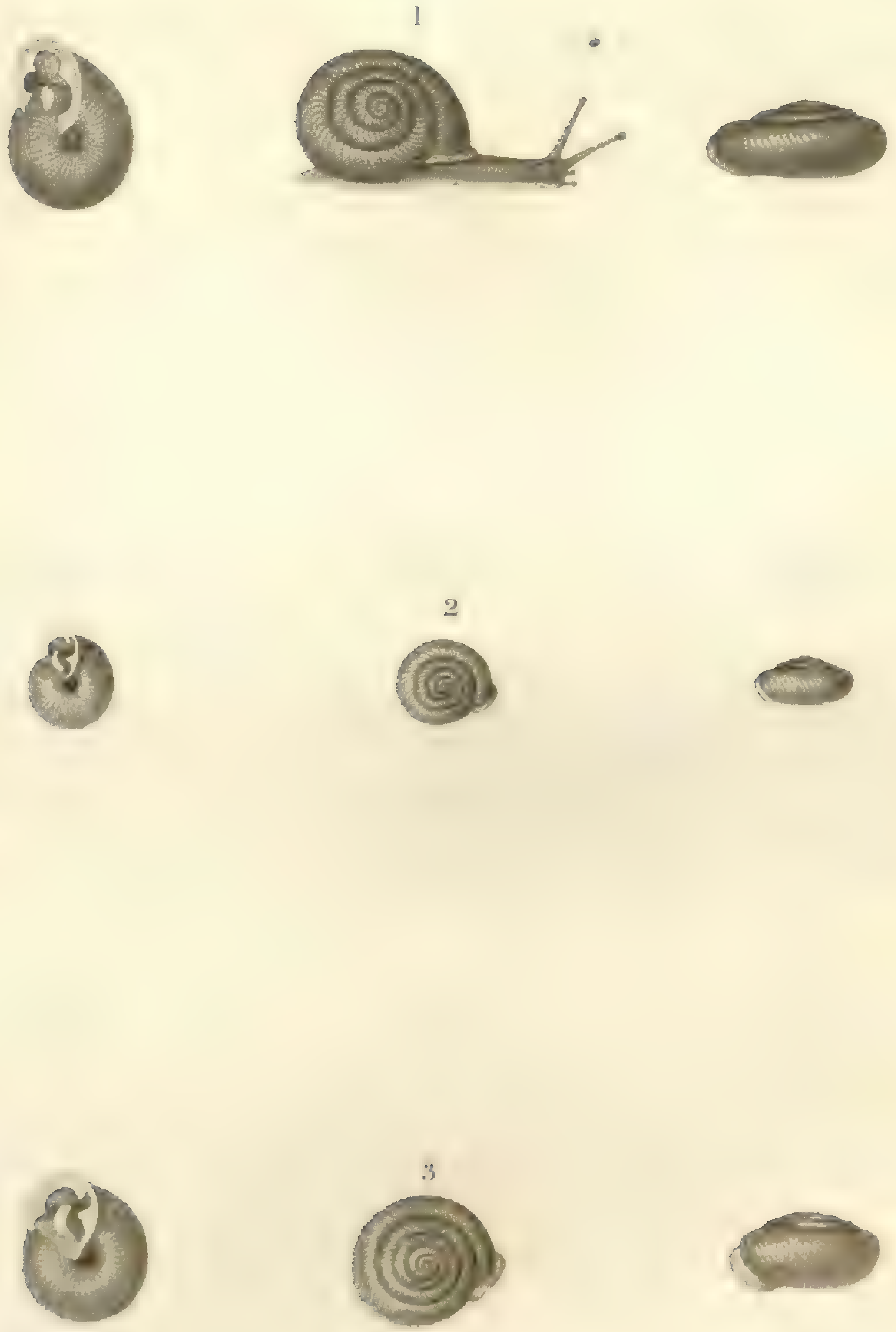
Storm Sc

PL. XVII.



Helix tridentata. SAY.

Nutting del. Storm S.



[illegible] del. *Helix tridentata*, SAY. Storm Sc.

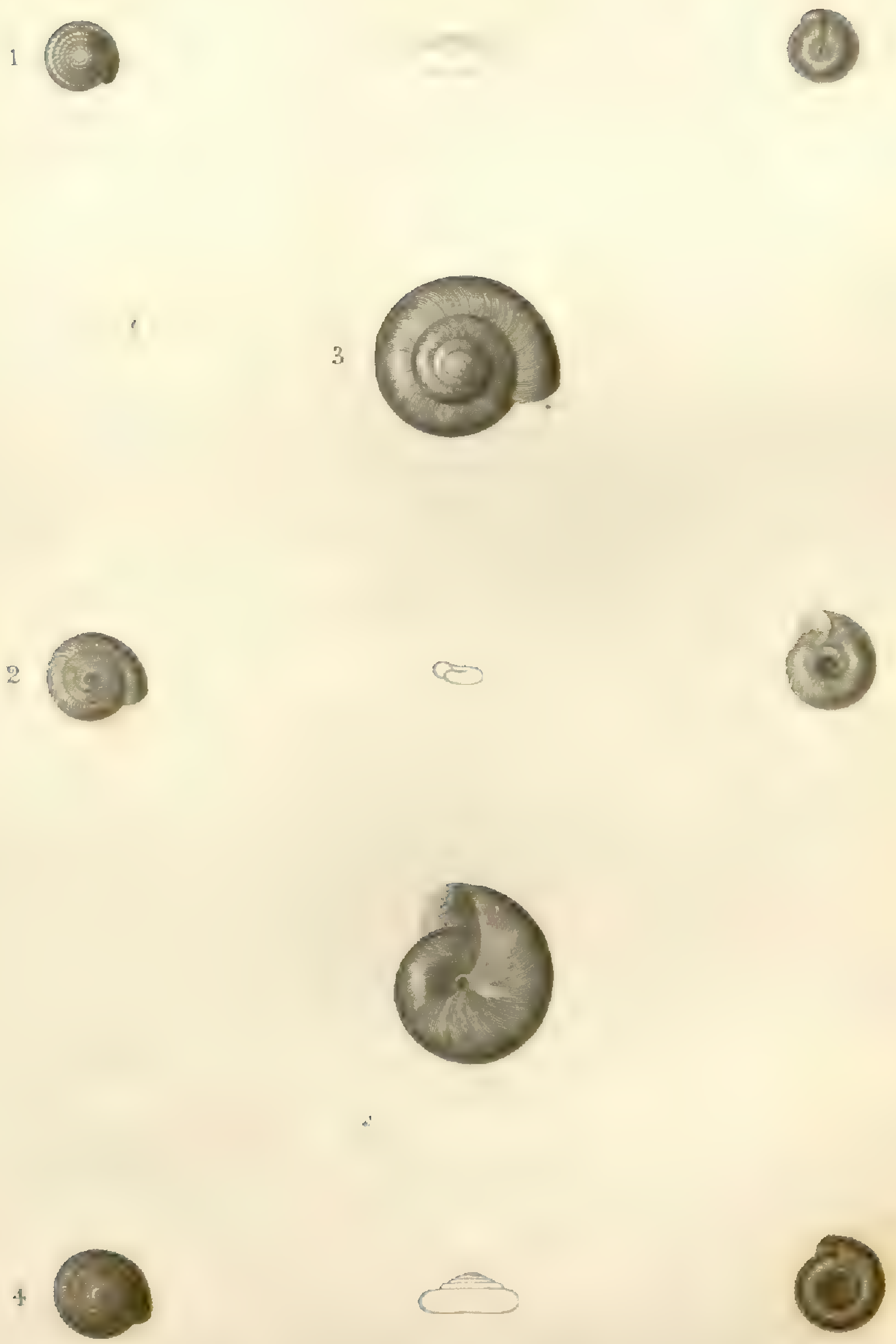
PL. XIX.

1. 2. *Helix auriculata.* SAY

3 – *fatigiata.*

4 – *septemvolva.*

Nutting del — Stern S.



1. *Helix interna*, SAY.   3. *Helix inornata*, SAY.

2. " *limatula*, BINNEY.   4. " *perspectiva*, SAY.

5. *H* " *striatella*. ANTHONY. *See* PL. III. F. 2.

Nutting Del.   Warren Sc.

XXI.	1	*Helix*	*arborea* SAY	5	*Helix*	*multidentata* BINNEY
	2	..	*electrina* GOULD	6	..	*lineata* SAY
	3	..	*indentata* SAY	XXVI. 1	..	*labyrinthica* SAY
	4	..	*minuscula* BINNEY	3	..	*chersina* SAY

Helix solitaria. Say.

Helix fuliginosa, Griffith.

[illegible] del.

Helix alternata. _ Say.

Nutting del. Oscar A. Lawson Sc.

b.
1. a.
3.
2.

1.
2.
3.
J. P. Kirtland del.
C. F. Storm sculp.

J. P. Kirtland del.

G. F. Storm sculp.